Colour Television

Chassis

TCM3.1L

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Service
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Service Manual

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2009-Jun-05

PHILIPS

1. Revision List

Manual xxxx xxx xxxx.0

- First release.

2. Technical Specifications and Connections

Index of this chapter:

2.1 Technical Specifications
2.2 Directions for Use
2.3 Connection Overview
2.4 Chassis Overview

Notes:

- Figures can deviate due to the different set executions.
- Specifications are indicative (subject to change).

2.1 Technical Specifications

For on-line product support please use the links in Table 2-1. Here is product information available, as well as getting started, user manuals, frequently asked questions and software & drivers.

Table 2-1 Described Model numbers

CTN	Styling	Published in SM
32PFL3404/77	Click	3122 785 18650
32PFL3404/78	Click	3122 785 18650
42PFL3604/77	Click	3122 785 18650
42PFL3604/78	Click	3122 785 18650

2.2 Directions for Use

Click on the hyperlinks in table above.

2.3 Connection Overview

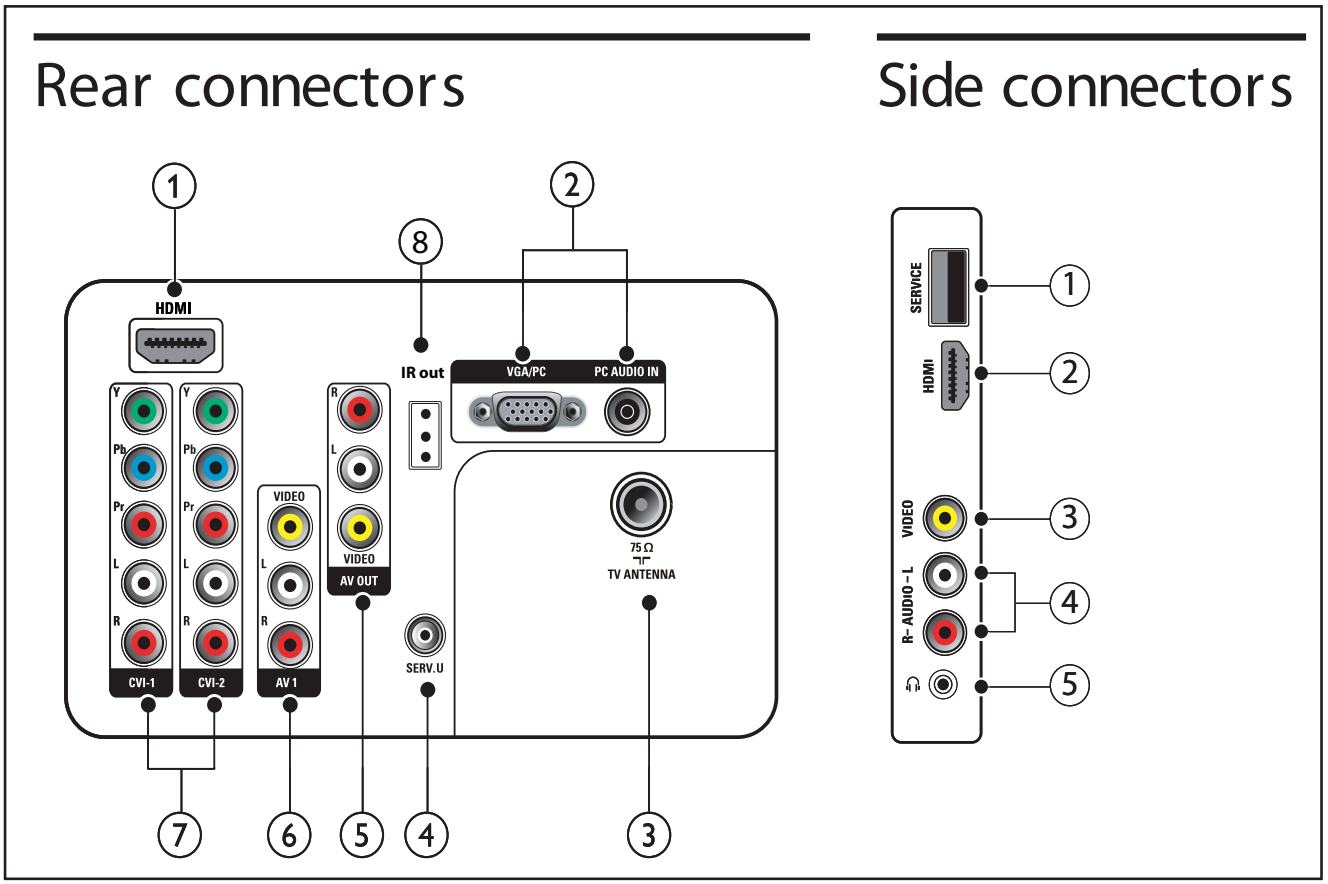

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Figure 2-1 Rear and side I/O connections

2.3.1 Side connections

Note: The following connector colour abbreviations are used (acc. to DIN/IEC 757): Bk= Black, Bu= Blue, Gn= Green, Gy= Grey, Rd= Red, Wh= White, and Ye= Yellow.

1 - USB2.0

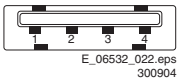

Figure 2-2 USB (type A)

1	- +5V	
2	- Data (-)	
3	- Data (+)	
4	- Ground	Gnd

2 - HDMI: Digital Video, Digital Audio - In

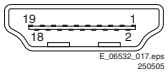

Figure 2-3 HDMI (type A) connector

1	- D2+	Data channel
2	- Shield	Gnd
3	- D2-	Data channel
4	- D1+	Data channel
5	- Shield	Gnd
6	- D1-	Data channel
7	- D0+	Data channel
8	- Shield	Gnd
9	- D0-	Data channel
10	- CLK+	Data channel
11	- Shield	Gnd
12	- CLK-	Data channel
13	- n.c.	
14	- n.c.	
15	- DDC_SCL	DDC clock
16	- DDC_SDA	DDC data
17	- Ground	Gnd
18	- +5V	
19	- HPD	Hot Plug Detect
20	- Ground	Gnd

3 & 4 - Cinch: Video CVBS - In, Audio - In

Ye	- Video CVBS	1 V_{PP} / 75 Ω
Wh	- Audio L	0.5 V_{RMS} / 10 kΩ
Rd	- Audio R	0.5 V_{RMS} / 10 kΩ

5 - Mini Jack: Audio Head phone - Out

Bk	- Head phone	32 - 600 Ω / 10 mW

2.3.2 Rear Connections

1 - HDMI 1 & 2: Digital Video, Digital Audio - In
See HDMI side connector.

2 - VGA/PC: Video RGB - In

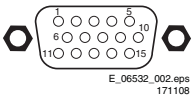

Figure 2-4 VGA Connector

1	- Video Red	0.7 V_{PP} / 75 Ω	
2	- Video Green	0.7 V_{PP} / 75 Ω	
3	- Video Blue	0.7 V_{PP} / 75 Ω	
4	- n.c.		
5	- Ground	Gnd	
6	- Ground Red	Gnd	
7	- Ground Green	Gnd	
8	- Ground Blue	Gnd	
9	- +5V_{DC}	+5 V	
10	- Ground Sync	Gnd	
11	- n.c.		
12	- DDC_SDA	DDC data	
13	- H-sync	0 - 5 V	
14	- V-sync	0 - 5 V	
15	- DDC_SCL	DDC clock	

2 - PC Audio: Mini Jack: VGA Audio - In

Bk	- Audio L/R	0.5 V_{RMS} / 10 kΩ

3 - Aerial - In

-	- IEC-type (EU)	Coax, 75 Ω

4 - Mini Jack: Service Connector (UART)

1	- Ground	Gnd
2	- UART_TX	Transmit
3	- UART_RX	Receive

5 - AV-Out: Cinch: Video CVBS - Out, Audio - Out

Ye	- Video CVBS	1 V_{PP} / 75 Ω
Wh	- Audio L	0.5 V_{RMS} /10 kΩ
Rd	- Audio R	0.5 V_{RMS} / 10 kΩ

6 - AV-1: Cinch: Video CVBS - In, Audio - In

Ye	- Video CVBS	1 V_{PP} / 75 Ω
Wh	- Audio L	0.5 V_{RMS} / 10 kΩ
Rd	- Audio R	0.5 V_{RMS} / 10 kΩ

7 - CVI-1&2: Cinch: Video YPbPr - In, Audio - In

Gn	- Video Y	1 V_{PP} / 75 Ω
Bu	- Video Pb	0.7 V_{PP} / 75 Ω
Rd	- Video Pr	0.7 V_{PP} / 75 Ω
Wh	- Audio L	0.5 V_{RMS} / 10 kΩ
Rd	- Audio R	0.5 V_{RMS} / 10 kΩ

8 - IR Out (if present)

1	- Ground	Gnd
2	- OIRI-IN	
3	- Ground	Gnd

2.4 Chassis Overview

Refer to chapter Block Diagrams for PWB/CBA locations.

3. Precautions, Notes, and Abbreviation List

Index of this chapter:

3.1 Safety Instructions
3.2 Warnings
3.3 Notes
3.4 Abbreviation List

3.1 Safety Instructions

Safety regulations require the following **during** a repair:

- Connect the set to the Mains/AC Power via an isolation transformer (> 800 VA).
- Replace safety components, indicated by the symbol ⚠, only by components identical to the original ones. Any other component substitution (other than original type) may increase risk of fire or electrical shock hazard. Of de set ontploft!

Safety regulations require that **after** a repair, the set must be returned in its original condition. Pay in particular attention to the following points:

- Route the wire trees correctly and fix them with the mounted cable clamps.
- Check the insulation of the Mains/AC Power lead for external damage.
- Check the strain relief of the Mains/AC Power cord for proper function.
- Check the electrical DC resistance between the Mains/AC Power plug and the secondary side (only for sets that have a Mains/AC Power isolated power supply):
  1. Unplug the Mains/AC Power cord and connect a wire between the two pins of the Mains/AC Power plug.
  2. Set the Mains/AC Power switch to the “on” position (keep the Mains/AC Power cord unplugged!).
  3. Measure the resistance value between the pins of the Mains/AC Power plug and the metal shielding of the tuner or the aerial connection on the set. The reading should be between 4.5 MΩ and 12 MΩ.
  4. Switch “off” the set, and remove the wire between the two pins of the Mains/AC Power plug.
- Check the cabinet for defects, to prevent touching of any inner parts by the customer.

3.2 Warnings

- All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically. Make sure that, during repair, you are connected with the same potential as the mass of the set by a wristband with resistance. Keep components and tools also at this same potential.
- Be careful during measurements in the high voltage section.
- Never replace modules or other components while the unit is switched “on”.
- When you align the set, use plastic rather than metal tools. This will prevent any short circuits and the danger of a circuit becoming unstable.

3.3 Notes

3.3.1 General

- Measure the voltages and waveforms with regard to the chassis (= tuner) ground (⏚), or hot ground (⏚), depending on the tested area of circuitry. The voltages and waveforms shown in the diagrams are indicative. Measure them in the Service Default Mode with a colour bar signal and stereo sound (L: 3 kHz, R: 1 kHz unless stated otherwise) and picture carrier at 475.25 MHz for PAL, or 61.25 MHz for NTSC (channel 3).
- Where necessary, measure the waveforms and voltages with (⊓) and without (⊼) aerial signal. Measure the voltages in the power supply section both in normal operation (⏻) and in stand-by (⏲). These values are indicated by means of the appropriate symbols.

3.3.2 Schematic Notes

- All resistor values are in ohms, and the value multiplier is often used to indicate the decimal point location (e.g. 2K2 indicates 2.2 kΩ).
- Resistor values with no multiplier may be indicated with either an “E” or an “R” (e.g. 220E or 220R indicates 220 Ω).
- All capacitor values are given in micro-farads ($\mu = \times 10^{-6}$), nano-farads ($n = \times 10^{-9}$), or pico-farads ($p = \times 10^{-12}$).
- Capacitor values may also use the value multiplier as the decimal point indication (e.g. 2p2 indicates 2.2 pF).
- An “asterisk” (*) indicates component usage varies. Refer to the diversity tables for the correct values.
- The correct component values are listed on the Philips Spare Parts Web Portal.

3.3.3 Spare Parts

For the latest spare part overview, consult your Philips Spare Part web portal.

3.3.4 BGA (Ball Grid Array) ICs

Introduction

For more information on how to handle BGA devices, visit this URL: http://www.atyourservice-magazine.com. Select “Magazine”, then go to “Repair downloads”. Here you will find Information on how to deal with BGA-ICs.

BGA Temperature Profiles

For BGA-ICs, you **must** use the correct temperature-profile. Where applicable and available, this profile is added to the IC Data Sheet information section in this manual.

3.3.5 Lead-free Soldering

Due to lead-free technology some rules have to be respected by the workshop during a repair:

- Use only lead-free soldering tin. If lead-free solder paste is required, please contact the manufacturer of your soldering equipment. In general, use of solder paste within workshops should be avoided because paste is not easy to store and to handle.
- Use only adequate solder tools applicable for lead-free soldering tin. The solder tool must be able:
  - To reach a solder-tip temperature of at least 400°C.
  - To stabilize the adjusted temperature at the solder-tip.
  - To exchange solder-tips for different applications.
- Adjust your solder tool so that a temperature of around 360°C - 380°C is reached and stabilized at the solder joint. Heating time of the solder-joint should not exceed ~ 4 sec. Avoid temperatures above 400°C, otherwise wear-out of tips will increase drastically and flux-fluid will be destroyed. To avoid wear-out of tips, switch “off” unused equipment or reduce heat.
- Mix of lead-free soldering tin/parts with leaded soldering tin/parts is possible but PHILIPS recommends strongly **to avoid** mixed regimes. If this cannot be avoided, carefully clear the solder-joint from old tin and re-solder with new tin.

3.3.6 Alternative BOM identification

It should be noted that on the European Service website, “Alternative BOM” is referred to as “Design variant”.

The **third digit** in the serial number (example: AG**2**B0335000001) indicates the number of the alternative B.O.M. (Bill Of Materials) that has been used for producing the specific TV set. In general, it is possible that the same TV model on the market is produced with e.g. two different types of displays, coming from two different suppliers. This will then result in sets which have the same CTN (Commercial Type Number; e.g. 28PW9515/12) but which have a different B.O.M. number.
By looking at the third digit of the serial number, one can identify which B.O.M. is used for the TV set he is working with. If the third digit of the serial number contains the number “1” (example: AG**1**B033500001), then the TV set has been manufactured according to B.O.M. number 1. If the third digit is a “2” (example: AG**2**B0335000001), then the set has been produced according to B.O.M. no. 2. This is important for ordering the correct spare parts!
For the third digit, the numbers 1...9 and the characters A...Z can be used, so in total: 9 plus 26= 35 different B.O.M.s can be indicated by the third digit of the serial number.

Identification: The bottom line of a type plate gives a 14-digit serial number. Digits 1 and 2 refer to the production centre (e.g. AG is Bruges), digit 3 refers to the B.O.M. code, digit 4 refers to the Service version change code, digits 5 and 6 refer to the production year, and digits 7 and 8 refer to production week (in example below it is 2006 week 17). The 6 last digits contain the serial number.

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090121

Figure 3-1 Serial number (example)

3.3.7 Board Level Repair (BLR) or Component Level Repair (CLR)

If a board is defective, consult your repair procedure to decide if the board has to be exchanged or if it should be repaired on component level.
If your repair procedure says the board should be exchanged completely, do not solder on the defective board. Otherwise, it cannot be returned to the O.E.M. supplier for back charging!

3.3.8 Practical Service Precautions

- **It makes sense to avoid exposure to electrical shock.** While some sources are expected to have a possible dangerous impact, others of quite high potential are of limited current and are sometimes held in less regard.
- **Always respect voltages**. While some may not be dangerous in themselves, they can cause unexpected reactions that are best avoided. Before reaching into a powered TV set, it is best to test the high voltage insulation. It is easy to do, and is a good service precaution.

3.4 Abbreviation List

0/6/12	SCART switch control signal on A/V board. 0 = loop through (AUX to TV), 6 = play 16 : 9 format, 12 = play 4 : 3 format
AARA	Automatic Aspect Ratio Adaptation: algorithm that adapts aspect ratio to remove horizontal black bars; keeps the original aspect ratio
ACI	Automatic Channel Installation: algorithm that installs TV channels directly from a cable network by means of a predefined TXT page
ADC	Analogue to Digital Converter
AFC	Automatic Frequency Control: control signal used to tune to the correct frequency
AGC	Automatic Gain Control: algorithm that controls the video input of the feature box
AM	Amplitude Modulation
AP	Asia Pacific
AR	Aspect Ratio: 4 by 3 or 16 by 9
ASF	Auto Screen Fit: algorithm that adapts aspect ratio to remove horizontal black bars without discarding video information
ATSC	Advanced Television Systems Committee, the digital TV standard in the USA
ATV	See Auto TV
Auto TV	A hardware and software control system that measures picture content, and adapts image parameters in a dynamic way
AV	External Audio Video
AVC	Audio Video Controller
AVIP	Audio Video Input Processor
B/G	Monochrome TV system. Sound carrier distance is 5.5 MHz
BLR	Board-Level Repair
BTSC	Broadcast Television Standard Committee. Multiplex FM stereo sound system, originating from the USA and used e.g. in LATAM and AP-NTSC countries
B-TXT	Blue TeleteXT
C	Centre channel (audio)
CEC	Consumer Electronics Control bus: remote control bus on HDMI connections
CL	Constant Level: audio output to connect with an external amplifier
CLR	Component Level Repair
ComPair	Computer aided rePair
CP	Connected Planet / Copy Protection
CSM	Customer Service Mode
CTI	Color Transient Improvement: manipulates steepness of chroma transients
CVBS	Composite Video Blanking and Synchronization
DAC	Digital to Analogue Converter
DBE	Dynamic Bass Enhancement: extra low frequency amplification
DDC	See “E-DDC”
D/K	Monochrome TV system. Sound carrier distance is 6.5 MHz
DFI	Dynamic Frame Insertion
DFU	Directions For Use: owner's manual
DMR	Digital Media Reader: card reader
DMSD	Digital Multi Standard Decoding
DNM	Digital Natural Motion

DNR	Digital Noise Reduction: noise reduction feature of the set
DRAM	Dynamic RAM
DRM	Digital Rights Management
DSP	Digital Signal Processing
DST	Dealer Service Tool: special remote control designed for service technicians
DTCP	Digital Transmission Content Protection; A protocol for protecting digital audio/video content that is traversing a high speed serial bus, such as IEEE-1394
DVB-C	Digital Video Broadcast - Cable
DVB-T	Digital Video Broadcast - Terrestrial
DVD	Digital Versatile Disc
DVI(-d)	Digital Visual Interface (d= digital only)
E-DDC	Enhanced Display Data Channel (VESA standard for communication channel and display). Using E-DDC, the video source can read the EDID information form the display.
EDID	Extended Display Identification Data (VESA standard)
EEPROM	Electrically Erasable and Programmable Read Only Memory
EMI	Electro Magnetic Interference
EPLD	Erasable Programmable Logic Device
EU	Europe
EXT	EXTernal (source), entering the set by SCART or by cinches (jacks)
FDS	Full Dual Screen (same as FDW)
FDW	Full Dual Window (same as FDS)
FLASH	FLASH memory
FM	Field Memory or Frequency Modulation
FPGA	Field-Programmable Gate Array
FTV	Flat TeleVision
Gb/s	Giga bits per second
G-TXT	Green TeleteXT
H	H_sync to the module
HD	High Definition
HDD	Hard Disk Drive
HDCP	High-bandwidth Digital Content Protection: A “key” encoded into the HDMI/DVI signal that prevents video data piracy. If a source is HDCP coded and connected via HDMI/DVI without the proper HDCP decoding, the picture is put into a “snow vision” mode or changed to a low resolution. For normal content distribution the source and the display device must be enabled for HDCP “software key” decoding.
HDMI	High Definition Multimedia Interface
HP	HeadPhone
I	Monochrome TV system. Sound carrier distance is 6.0 MHz
I^2C	Inter IC bus
I^2D	Inter IC Data bus
I^2S	Inter IC Sound bus
IF	Intermediate Frequency
IR	Infra Red
IRQ	Interrupt Request
ITU-656	The ITU Radio communication Sector (ITU-R) is a standards body subcommittee of the International Telecommunication Union relating to radio communication. ITU-656 (a.k.a. SDI), is a digitized video format used for broadcast grade video. Uncompressed digital component or digital composite signals can be used. The SDI signal is self-synchronizing, uses 8 bit or 10 bit data words, and has a maximum data rate of 270 Mbit/s, with a minimum bandwidth of 135 MHz.
ITV	Institutional TeleVision; TV sets for hotels, hospitals etc.
LS	Last Status; The settings last chosen by the customer and read and stored in RAM or in the NVM. They are called at start-up of the set to configure it according to the customer's preferences
LATAM	Latin America
LCD	Liquid Crystal Display
LED	Light Emitting Diode
L/L'	Monochrome TV system. Sound carrier distance is 6.5 MHz. L' is Band I, L is all bands except for Band I
LPL	LG.Philips LCD (supplier)
LS	Loudspeaker
LVDS	Low Voltage Differential Signalling
Mbps	Mega bits per second
M/N	Monochrome TV system. Sound carrier distance is 4.5 MHz
MIPS	Microprocessor without Interlocked Pipeline-Stages; A RISC-based microprocessor
MOP	Matrix Output Processor
MOSFET	Metal Oxide Silicon Field Effect Transistor, switching device
MPEG	Motion Pictures Experts Group
MPIF	Multi Platform InterFace
MUTE	MUTE Line
NC	Not Connected
NICAM	Near Instantaneous Compounded Audio Multiplexing. This is a digital sound system, mainly used in Europe.
NTC	Negative Temperature Coefficient, non-linear resistor
NTSC	National Television Standard Committee. Color system mainly used in North America and Japan. Color carrier NTSC M/N= 3.579545 MHz, NTSC 4.43= 4.433619 MHz (this is a VCR norm, it is not transmitted off-air)
NVM	Non-Volatile Memory: IC containing TV related data such as alignments
O/C	Open Circuit
OSD	On Screen Display
OTC	On screen display Teletext and Control; also called Artistic (SAA5800)
P50	Project 50: communication protocol between TV and peripherals
PAL	Phase Alternating Line. Color system mainly used in West Europe (color carrier= 4.433619 MHz) and South America (color carrier PAL M= 3.575612 MHz and PAL N= 3.582056 MHz)
PCB	Printed Circuit Board (same as “PWB”)
PCM	Pulse Code Modulation
PDP	Plasma Display Panel
PFC	Power Factor Corrector (or Pre-conditioner)
PIP	Picture In Picture
PLL	Phase Locked Loop. Used for e.g. FST tuning systems. The customer can give directly the desired frequency
POD	Point Of Deployment: a removable CAM module, implementing the CA system for a host (e.g. a TV-set)
POR	Power On Reset, signal to reset the uP
PTC	Positive Temperature Coefficient, non-linear resistor
PWB	Printed Wiring Board (same as “PCB”)

PWM	Pulse Width Modulation
QRC	Quasi Resonant Converter
QTNR	Quality Temporal Noise Reduction
QVCP	Quality Video Composition Processor
RAM	Random Access Memory
RGB	Red, Green, and Blue. The primary color signals for TV. By mixing levels of R, G, and B, all colors (Y/C) are reproduced.
RC	Remote Control
RC5 / RC6	Signal protocol from the remote control receiver
RESET	RESET signal
ROM	Read Only Memory
RSDS	Reduced Swing Differential Signalling data interface
R-TXT	Red TeleteXT
SAM	Service Alignment Mode
S/C	Short Circuit
SCART	Syndicat des Constructeurs d'Appareils Radiorécepteurs et Téléviseurs
SCL	Serial Clock I^2C
SCL-F	CLock Signal on Fast I^2C bus
SD	Standard Definition
SDA	Serial Data I^2C
SDA-F	DAta Signal on Fast I^2C bus
SDI	Serial Digital Interface, see “ITU-656”
SDRAM	Synchronous DRAM
SECAM	SEequence Couleur Avec Mémoire. Color system mainly used in France and East Europe. Color carriers= 4.406250 MHz and 4.250000 MHz
SIF	Sound Intermediate Frequency
SMPS	Switched Mode Power Supply
SoC	System on Chip
SOG	Sync On Green
SOPS	Self Oscillating Power Supply
SPI	Serial Peripheral Interface bus; a 4-wire synchronous serial data link standard
S/PDIF	Sony Philips Digital InterFace
SRAM	Static RAM
SRP	Service Reference Protocol
SSB	Small Signal Board
STBY	STand-BY
SVGA	800 × 600 (4:3)
SVHS	Super Video Home System
SW	Software
SWAN	Spatial temporal Weighted Averaging Noise reduction
SXGA	1280 × 1024
TFT	Thin Film Transistor
THD	Total Harmonic Distortion
TMDS	Transmission Minimized Differential Signalling
TXT	TeleteXT
TXT-DW	Dual Window with TeleteXT
UI	User Interface
uP	Microprocessor
UXGA	1600 × 1200 (4:3)
V	V-sync to the module
VESA	Video Electronics Standards Association
VGA	640 × 480 (4:3)
VL	Variable Level out: processed audio output toward external amplifier
VSB	Vestigial Side Band; modulation method
WYSIWYR	What You See Is What You Record: record selection that follows main picture and sound
WXGA	1280 × 768 (15:9)
XTAL	Quartz crystal
XGA	1024 × 768 (4:3)
Y	Luminance signal
Y/C	Luminance (Y) and Chrominance (C) signal
YPbPr	Component video. Luminance and scaled color difference signals (B-Y and R-Y)
YUV	Component video

4. Mechanical Instructions

Index of this chapter:

4.1 Service Positions
4.2 Cable Dressing and Taping
4.3 Assy/Panel Removal
4.4 Set Re-assembly

Notes:

- Figures below can deviate slightly from the actual situation, due to the different set executions.

4.1 Service Positions

For easy servicing of this set, there are a few possibilities created:

- The buffers from the packaging.
- Foam bars (created for Service).

4.1.1 Foam Bars

The foam bars (order code 3122 785 90580 for two pieces) can be used for all types and sizes of Flat TVs.
See figure Figure 4-1 for details. Sets with a display of 42" and larger, require **four** foam bars [1]. Ensure that the foam bars are always supporting the cabinet and **never** only the display.
Caution: Failure to follow these guidelines can seriously damage the display!
By positioning the TV face down on the (ESD protective) foam bars, a stable situation is created to perform measurements and alignments. By placing a mirror under the TV, the screen can be monitored.

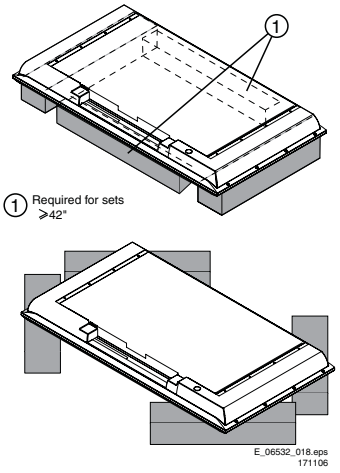
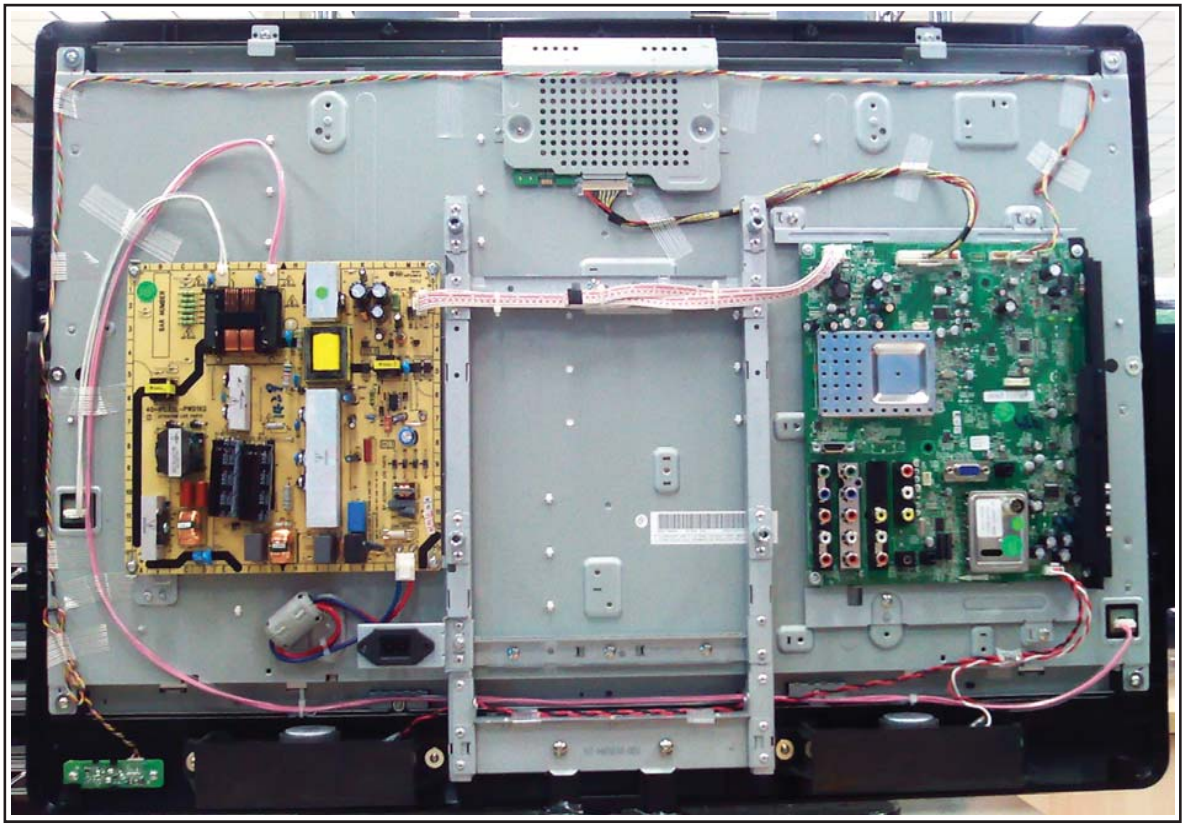


Figure 4-1 Foam bars

4.2 Cable Dressing and Taping



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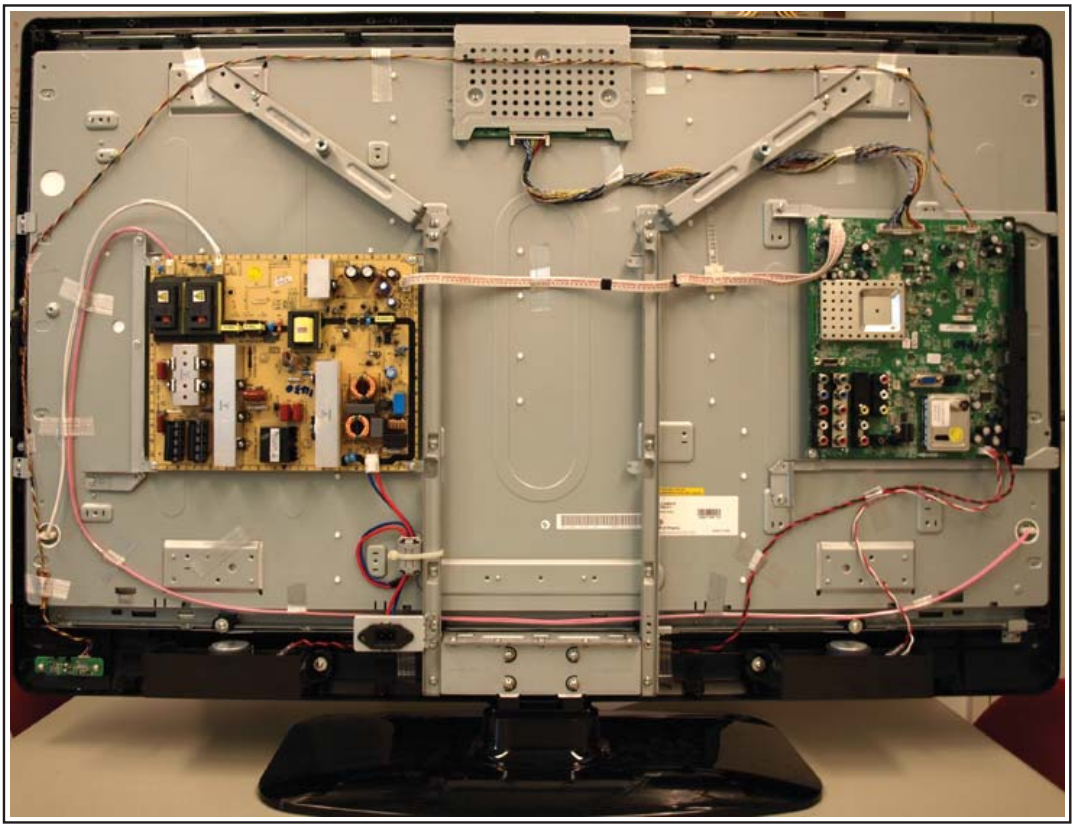
090603

Figure 4-2 Cable dressing and taping 32" model



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090309

Figure 4-3 Cable dressing and taping 42" model

4.3 Assy/Panel Removal

Caution: It is mandatory to remount screws at their original position during re-assembly. Failure to do so may result in damaging the SSB. Refer to Figure 4-4 for details.

4.3.1 Rear Cover

Warning/Notes:
- Disconnect the mains power cord before rear cover removal.
- It is **not** necessary to remove the stand while removing the rear cover.
- Re-use the original screws when re-assembling the TV.

1. Remove all screws of the rear cover.
   Important: Be sure to re-use the same screws when remounting the rear cover, as these screws have a 30 degrees thread instead of the common used 45 degrees thread.
2. Lift the rear cover from the TV. Make sure that wires and flat coils are not damaged while lifting the rear cover from the set.

4.3.2 Speakers

Each speaker unit is mounted (in rubber) with two screws. When defective, replace the whole unit.

4.3.3 IR & LED Board

1. Remove the two screws that hold the assy.
2. Unplug the connector on the board (be aware of the connector lock).

When defective, replace the whole unit.

4.3.4 Key Board Control Panel

1. Remove the two screws that hold the assy.
2. Unplug the connectors on the board.

When defective, replace the whole unit.

4.3.5 Main Supply Panel

1. Unplug all connectors (be aware of the connector locks).
2. Remove the fixation screws (screw #1).
3. Take the board out.

When defective, replace the whole unit.

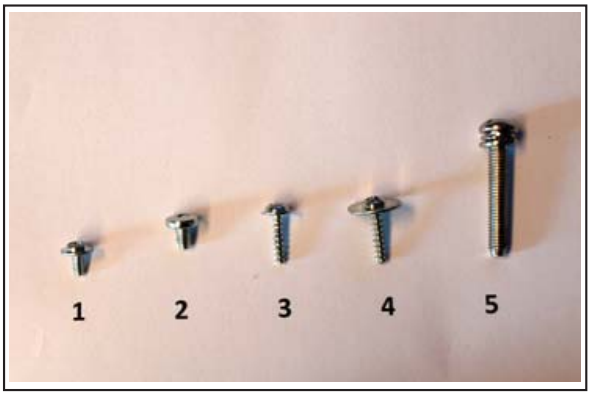
4.3.6 Small Signal Board (SSB)

1. Unplug all connectors on the SSB.
2. Remove all screws (screw #1) that hold the board.
3. The SSB can now be taken out of the set, together with the side connector cover.

4.3.7 LCD Panel

Description below is based upon the 42" model with LG display. Disassembly method of other LCD panels is comparable to the one described below. See also “Mechanical layout” drawings.

4. Unplug and remove all cables.
5. Remove the Main Supply Panel and Small SIgnal Board as described earlier.
6. Remove **all metal brackets** that are mounted on the panel (be aware of the different screws used, see figure “Used screws”):
   – Two VESA holder brackets at the top (screw #2).
   – Two SSB holder brackets (screws #2 and #3).
   – Two central holder brackets (screw #2).
   – One PSU holder bracket (screw#1).
7. Remove the stand [1] (screw #5).
8. Remove the subframe of the stand [2] (screw #2).
9. Remove the brackets [3] (screw #3) that secure the LCD panel, and remove screws #4 at the bottom of the LCD.
10. The LCD panel can now be lifted from the front cabinet.



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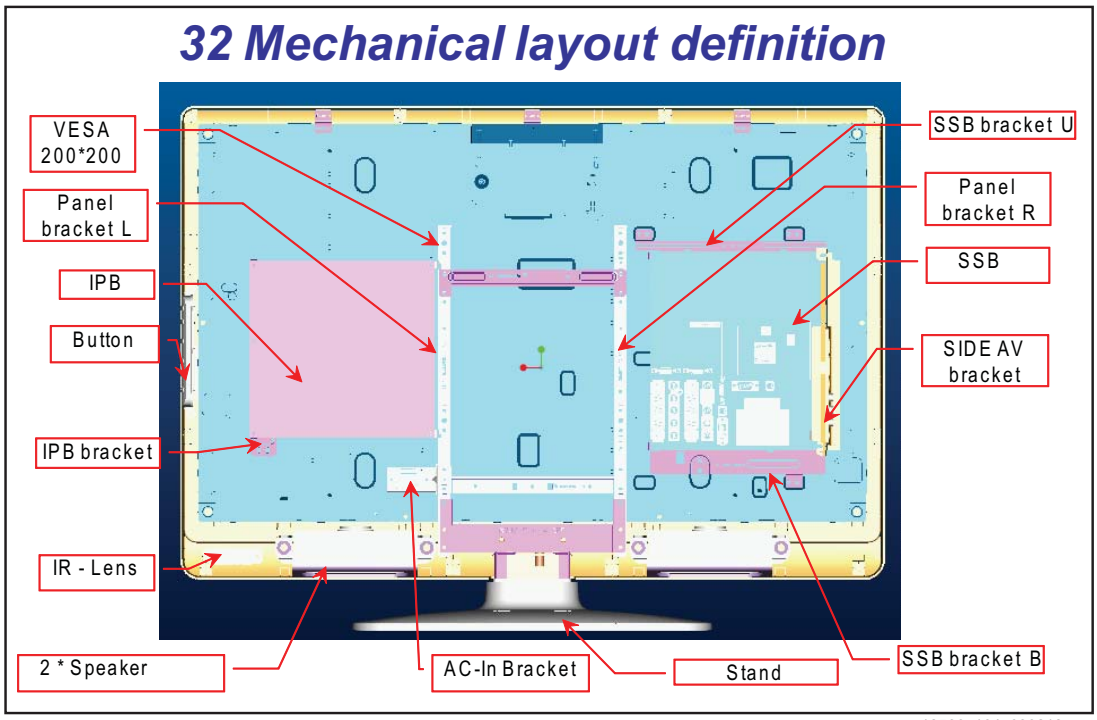
090311

Figure 4-4 Used screws



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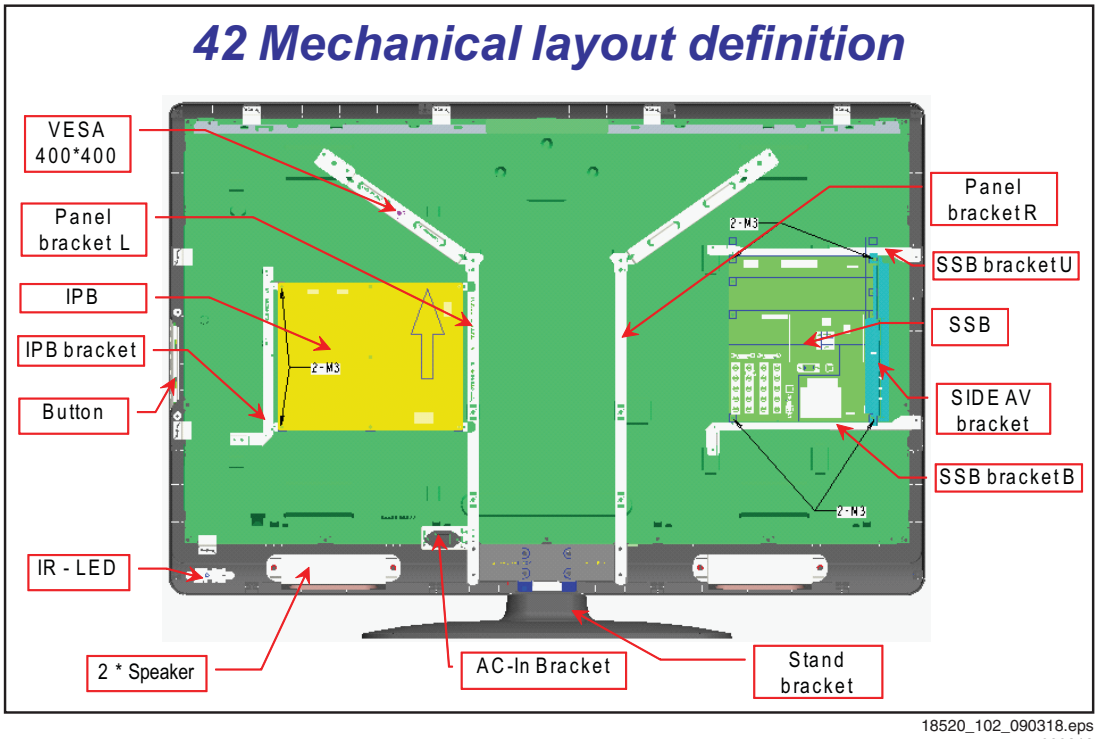
090318

Figure 4-5 Mechanical layout 32" model



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090318

Figure 4-6 Mechanical layout 42" model

4.4 Set Re-assembly

To re-assemble the whole set, execute all processes in reverse order.

Notes:

- While re-assembling, make sure that all cables are placed and connected in their original position.
- Pay special attention not to damage the EMC foams in the set. Ensure that EMC foams are mounted correctly.

5. Service Modes, Error Codes, and Fault Finding

Index of this chapter:

5.1 Measurement Conditions
5.2 Service Modes
5.3 Service Tools
5.4 Error Codes
5.5 The Blinking LED Procedure (LAYER-2 codes)
5.6 Fault Finding and Repair Tips
5.7 Software Upgrading

5.1 Measurement Conditions

Perform measurements under the following conditions:
- Service Default Mode.
- Video: Colour bar signal.
- Audio: 3 kHz left, 1 kHz right.

5.2 Service Modes

Note: For the new model range, a new remote control (RC) is used with some renamed buttons. This has an impact on the activation of the Service modes. For instance the old "MENU" button is now called "HOME" (or is indicated by a "house" icon).

Service Default mode (SDM) and Service Alignment Mode (SAM) offer several features for the service technician, while the Customer Service Mode (CSM) is used for communication between the call centre and the customer.
This chassis also offers the option of using ComPair, a hardware interface between a computer and the TV chassis. It offers the abilities of structured troubleshooting, error code reading, and software version read-out for all chassis.
(see also section 5.3.1 ComPair).

5.2.1 Service Default Mode (SDM)

Purpose
To start the blinking LED procedure where only layer 2 errors are displayed (see also section 5.4 Error Codes).

How to Activate SDM
Use the standard RC-transmitter and key in the code "062596", directly followed by the "MENU" (or HOME) button.
After activating this mode, "SDM" will appear in the upper right corner of the screen (when a picture is available).

How to Navigate
When the "MENU" (or HOME) button is pressed on the RC transmitter, the set will toggle between the SDM and the normal user menu (with the SDM mode still active in the background).

How to Exit SDM
Switch the set to STAND-BY via the RC-transmitter.

5.2.2 Service Alignment Mode (SAM)

Purpose
- To perform (software) alignments.
- To change option settings.
- To easily identify the used software version.
- To view operation hours.
- To display (or clear) the error code buffer.

How to Activate SAM
Via a standard RC transmitter: key in the code "062596" directly followed by the "i+/INFO" button.

Contents of SAM (see also 6.4 Option Settings):
- **Syst. Info.** Giving overview of:
  - **Op. Hours.** During the life time cycle of the TV, a life timer is kept. It counts the normal operation hours, not the Stand-by hours. The actual value of the life timer is displayed in SAM in decimal value. For every two start-ups the counter increases by one. Min. 5 digits are displayed in decimal digits. In detail:
    - Every 2x cold start-ups, to display a picture, increases the counter by 1 (i.e. interrupt the mains supply 2x while the set is ON).
    - Every 2x warm start-ups (from Stand-by), to display a picture, increases the counter by 1.
    - Every hour of normal operating increases the counter by 1 (i.e. if a set is continue ON for 2 hours, then increase the counter by 2).
    - Stand-by hours are NOT counted.
  - **Main SW ID.** Displays the loaded main SW version.
  - **Error Code x** (where "x" is 1 to 5). The most recent error is displayed at the upper position (for an error explanation see section 5.4 Error Codes).
- **Clear Codes.** When "arrow right" is pressed and then the "OK" button is pressed, the error buffer is reset.
- **Options.** Choosing the CTN will set the options, see also chapter 6.4 Option Settings.
- **RGB Align.** This will activate the alignments sub-menu. See chapter 6.3.2 White Point for more details.
- **NVM Editor.** This will give the opportunity to directly change values in the NVM by selecting the address and value. Use decimal values! See chapter 6.4 Option Settings.
- **NVM Copy.** For easy transfer of NVM settings:
  - **Copy to USB.** To upload several settings from the TV to an USB stick. See 5-1 USB Copy content. To upload the settings, press "arrow right" (or the "OK button), confirm with "OK" and wait until "OK" appears. Now the settings are stored onto the USB stick can be used to download to another TV or other SSB. Uploading is of course only possible if the software is running and if a picture is available. This method is created to be able to save the customer's TV settings and to store them into another SSB.
  - **Copy from USB.** To download several settings from the USB stick to the TV. Same way of working as with uploading. To make sure that the download of the channel list from USB to the TV is executed properly, it is necessary to restart the TV and tune to a valid preset if necessary.

Table 5-1 USB Copy content

S/N	NVM USB Copy content		To be copied /Remarks
1	**Display settings**	White Point alignment, RGB	Yes
2	**Personal settings**	eg. Brightness, colour, hue, equalizer, band, head phone volume, child lock, time, picture format...	Yes
3	**Channel List**	Channel preset	Yes
4	**Options list**	Option code	Yes
5	AGC and AFC alignment	SSB specific	No.
6	HDCP key		No.
7	**Model**	22PFL1234D/10	Yes
8	**Production serial nbr.**	BA1A0837123456	Yes
9	Software Version	TXM21E 1.00	No. Read and display.
10	**Option Code (used display)**	009	yes
11	Codes	011 000 000 000 000	No. Error detection
12	SSB	996512312345	No
13	**Display**	996512345678	Yes
14	**PSU**	996512311111	Yes
15	NVM version	Supplier to advise NVM version	No. Read and display.

S/N	NVM USB Copy content		To be copied /Remarks
16	PQ version	Supplier to advise PQ version	No. Read and display.
17	HDCP key	Valid	No. Are measure results
18	Signal Quality/Present	Digital percentage and analog Yes/No.	No. Are measure results
19	Audio System	Detect and display	No. Are measure results
20	Video Format	Detect and display	No. Are measure results
21	Stand-by uP SW ID	Detect and display	No. Read and display

- **Tuner.** This will activate the alignments sub-menu. See chapter 6.3.1 Tuner AGC (RF AGC Take Over Point Adjustment) for more details.
- **Auto ADC.** This will activate the alignments sub-menu. See chapter 6.3.3 Auto ADC for more details.

How to Navigate
- In SAM, the menu items can be selected with the “Arrow up/down” key on the RC-transmitter. The selected item will be highlighted. When not all menu items fit on the screen, move the “Arrow up/down” key to display the next/previous menu items.
- With the “Arrow Left/Right” keys, it is possible to:
  – (De) activate the selected menu item.
  – (De) activate the selected sub menu.
- With the “OK” key, it is possible to activate the selected action.
- With the “Menu/Home” key, it is possible to go back to the previous selection.

How to Exit SAM
Switch the set to STAND-BY via the RC-transmitter.

5.2.3 Customer Service Mode (CSM)

Purpose
When a customer is having problems with his TV-set, he can call his dealer or the Customer Helpdesk. The service technician can then ask the customer to activate the CSM, in order to identify the status of the set. Now, the service technician can judge the severity of the complaint. In many cases, he can advise the customer how to solve the problem, or he can decide if it is necessary to visit the customer
The CSM is a read only mode; therefore, modifications in this mode are not possible

When CSM is activated:
- A test pattern will be displayed during 3 s. This test pattern is generated by the MT822x video processor. So if this test pattern is shown, it could be determined that the back end video chain (MT822x, LVDS, and display) of the SSB is working.
- The LAYER 1 error is displayed via the blinking front LED. Only the latest error is displayed. See also section 5.4 Error Codes.

How to Activate CSM
Key in the code “123654” via the standard RC transmitter.

Note: Activation of the CSM is only possible if there is no (user) menu on the screen!

How to Navigate
By means of the “Arrow up/down” button on the RC-transmitter, one can navigate through the menus.

Contents of CSM
The contents are displayed on two pages:

S/N	Description	Explanation
1	Model Number	NVM read/write (max. 16 characters)
2	Production Serial Nbr.	NVM read/write (max. 16 characters)
3	Software Version	Detect and Display SW version
4	Option Code	Store in NVM (panel code)
5	Codes	Layer-2 error code.
6	SSB	12NC NVM read/write (12 characters)
7	Display	12NC NVM read/write (12 characters)
8	PSU	12NC NVM read/write (12 characters)
9	NVM version	Detect and Display NVM version
10	HDCP key	Detect and display (valid/invalid)
11	Signal Quality/Present	Present / No signal
12	Audio System	Detect and display: Mono, Stereo, Nicam (signal dependent)
13	Video Format	Detect and display: signal dependent
14	Stand-by uP SW ID	Detect and display.

- **Model Number.** This information is very helpful for a helpdesk/workshop as reference for further diagnosis. In this way, it is not necessary for the customer to look at the rear of the TV-set. Note that if an NVM is replaced or is initialised after corruption, this model type has to be re-written to NVM. ComPair will foresee in a possibility to do this.
- **Production Serial Number.** Displays the production code (the serial number) of the TV. Note that if an NVM is replaced or is initialized after corruption, this production code has to be re-written to NVM. ComPair will foresee a in possibility to do this.
- **Software Version.** Displays the current main software version. In case of field problems that are related to software, this software can be upgraded. As it is consumer upgradeable, it will also be published on the Internet.
- **Option Code.** Gives the display codes as set in SAM. See also section 6.4 Option Settings.
- **Codes.** Gives the error code overview. See also table 5-3 Layer-2 code overview.
- **SSB.** Gives an identification of the SSB order code as stored in NVM. Note that if an NVM is replaced or is initialized after corruption, this identification number has to be re-written to NVM. ComPair will foresee in a possibility to do this.
- **Display.** Shows the 12NC of the display.
- **PSU.** Shows the 12NC of the Power Supply Unit.
- **NVM version.** Displays the SW-version that is used in the NVM.
- **HDCP key.** Indicates of the HDMI keys (or HDCP keys) are valid or not. In case these keys are not valid and the consumer wants to make use of the HDMI functionality, the SSB has to be replaced.
- **Signal Quality/Present.** Displays the received signal quality or its presence.
- **Audio System.** Displays the received audio system.
- **Video Format.** Displays the received video format.
- **Stand-by uP SW ID.** Displays the current Stand-by Processor software version.

How to Exit CSM
By pressing the “MENU/HOME” key, the OSD (i+) key, the Stand-by key or the power down button.

5.3 Service Tools

5.3.1 ComPair

Introduction

ComPair (Computer Aided Repair) is a Service tool for Philips Consumer Electronics products. and offers the following:

1. ComPair helps to quickly get an understanding on how to repair the chassis in a short and effective way.
2. ComPair allows very detailed diagnostics and is therefore capable of accurately indicating problem areas. No knowledge on I^2C or UART commands is necessary, because ComPair takes care of this.
3. ComPair speeds up the repair time since it can automatically communicate with the chassis (when the uP is working) and all repair information is directly available.
4. ComPair features TV software up possibilities.

Specifications

ComPair consists of a Windows based fault finding program and an interface box between PC and the (defective) product. The ComPair II interface box is connected **to the PC** via an USB cable. For the TV chassis, the ComPair interface box and the TV communicate via a bi-directional cable via the service connector(s).
The ComPair fault finding program is able to determine the problem of the defective television, by a combination of automatic diagnostics and an interactive question/answer procedure.

How to Connect

This is described in the chassis fault finding database in ComPair.

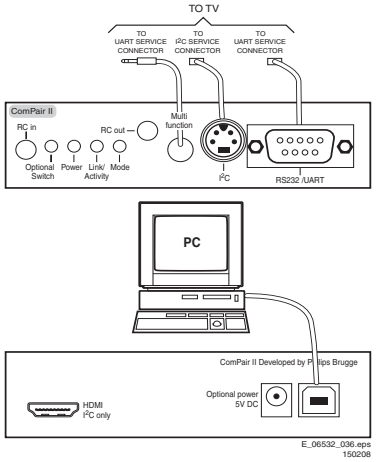


Figure 5-1 ComPair II interface connection

Caution: It is **compulsory** to connect the TV to the PC as shown in the picture above (with the ComPair interface in between), as the ComPair interface acts as a level shifter. If one connects the TV directly to the PC (via UART), ICs will be blown!

How to Order

ComPair II order codes:

- ComPair II interface: 3122 785 91020.
- Software is available via the Philips Service web portal.
- ComPair serial interface cable (using 3.5 mm Mini Jack connectors): 3138 188 75051.

Note: When having problems, please contact the local support desk.

5.4 Error Codes

5.4.1 Introduction

The error code buffer contains all detected errors since the last time the buffer was erased. The buffer is written from top to bottom (or left to right), new errors are logged at the top/left side, and all other errors shift one position to the bottom/right. When an error occurs, it is added to the list of errors, provided the list is not full. When the error buffer is full, then the new error is not added, and the error buffer stays intact (history is maintained).
To prevent that an occasional error stays in the list forever, the error is removed from the list after more than 50 hrs. of operation/

There is a simple blinking LED procedure for board level repair (home repair) the so called LAYER 1 errors, next to the existing errors which are LAYER 2 errors:

- LAYER 1 errors are one digit errors
- LAYER 2 errors are two digit errors.

When is LAYER 1 or 2 available:

- **In CSM mode:** When entering CSM: error **LAYER 1** will be displayed by blinking LED. Only the latest error is shown.
- **In SDM mode:** When SDM is entered via Remote Control code, **LAYER 2** is displayed via blinking LED.

Error display on screen:

- In CSM, no error codes are displayed on screen.
- In SAM, the complete error list is shown.

If possible, check the entire contents of the error buffer. In some situations, an error code is only the result of another error code and not the actual cause (e.g. a fault in the protection detection circuitry can also lead to a protection).
In case of non-intermittent faults, clear the error buffer before starting to repair (**before** clearing the buffer, write down the content, as this history can give significant information). This to ensure that old error codes are no longer present.

5.4.2 How to Read the Error Buffer

Use one of the following methods:

- On screen via SAM (only when a picture is visible). E.g.:
  - **000 000 000 000 000**: No errors detected
  - **017 000 000 000 000**: Error code 17 is the last and only detected error.
  - **015 017 000 000 000**: Error code 17 was first detected and error code 15 is the last detected error.
- Via the Blinking LED procedure.
- Via ComPair.

5.4.3 How to Clear the Error Buffer

Use one of the following methods:

- By activation of the “Clear Codes” command in the SAM menu.
- With a normal RC, key in sequence “062599” followed by “OK”.

5.4.4 Error Codes

Take notice that some errors need several minutes before they start blinking or before they will be logged. So in case of problems wait 2 minutes from start-up onwards, and then check if the front LED is blinking or if an error is logged.

Table 5-2 Layer 1 code overview

Code	Board
2	SSB
3	Platform supply (12V detection)

Table 5-3 Layer-2 code overview

Layer 2 error code	Error Description	Detection Method	Type	Remarks
0	No Error	N/A	N/A	N/A
14	General I^2C	I^2C Bus	Spontaneous blinking	Communication Error on I^2C bus
15	Tuner	I^2C Bus	Error Log + blinking in SDM	Communication Error with Tuner
16	Demodulator	I^2C Bus	Error Log + blinking in SDM	Communication Error with TDA9886T
17	Audio amplifier	I^2C Bus	Error Log + blinking in SDM	Communication Error with Audio amplifier
18	NVM EEPROM	I^2C Bus	Spontaneous blinking	Communication Error with EEPROM

5.5 The Blinking LED Procedure (LAYER-2 codes)

5.5.1 Introduction

The software is capable of identifying different kinds of errors. Because it is possible that more than one error can occur over time, an error buffer is available that is capable of storing the last five errors that occurred. This is useful if the OSD is not working properly.

Errors can also be displayed by the blinking LED procedure. The method is to repeatedly let the LED pulse with as many pulses as the error code number, followed by a time period of 1.5 seconds in which the LED is “off”. Then this sequence is repeated.
E.g. error code 4 will result in four times the sequence LED “on” for 0.25 seconds / LED “off” for 0.25 seconds. After this sequence the LED will be “off” for 1.5 seconds. Any RC command terminates this sequence.

Displaying the entire error buffer
The entire error buffer can be displayed when service mode “SDM” is entered (by remote control command 062596<MENU>). When in protection, this sequence will not work, but than LAYER-1 error code should suffice.
In order to avoid confusion with RC signal reception blinking, this blinking procedure is terminated when a RC command is received.

5.5.2 How to Activate

Use one of the following methods:

- **Activate the CSM**. The blinking front LED will show only the latest LAYER-1 error.
- **Activate the SDM**. The blinking front LED will show the entire contents of the LAYER-2 error buffer.

5.6 Fault Finding and Repair Tips

5.6.1 Fault Finding Flow Charts

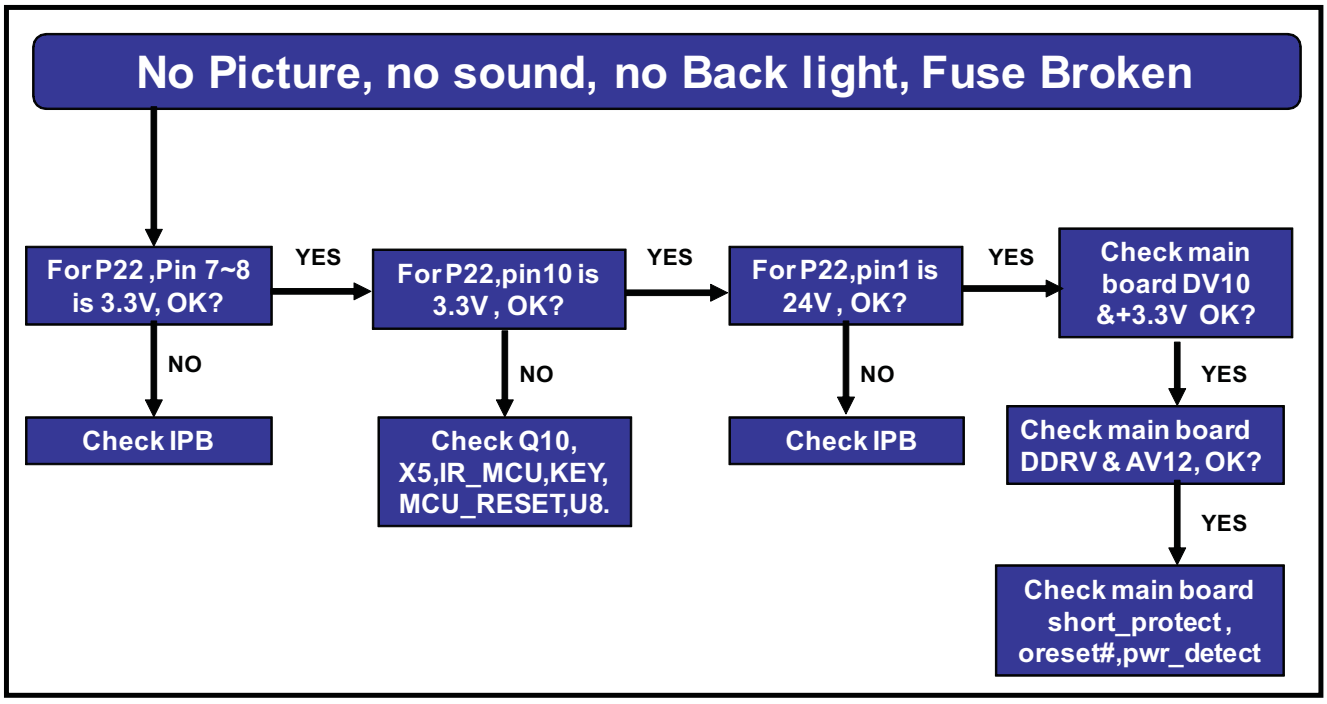


Figure 5-2 No picture, no sound, no backlight. Fuse broken.

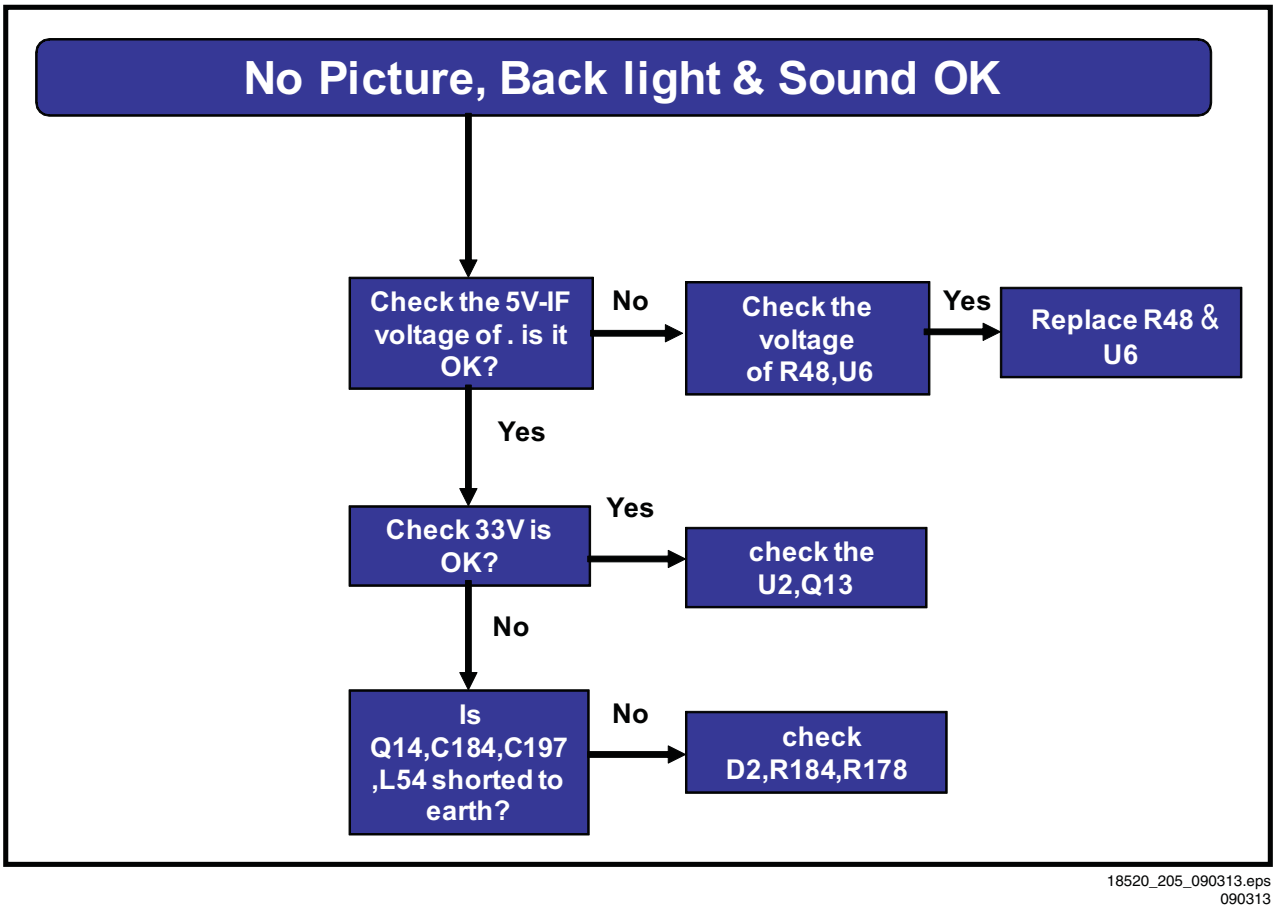
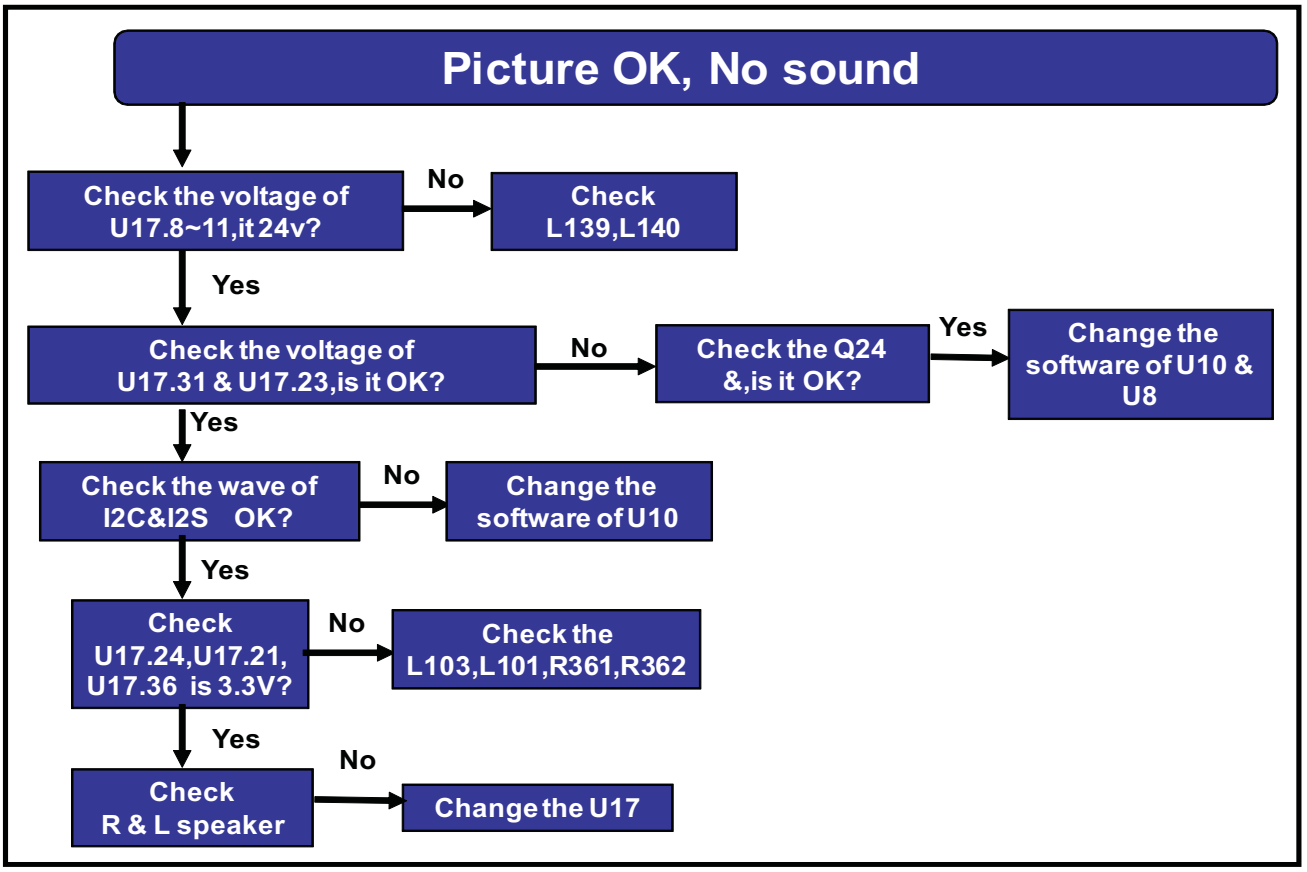


Figure 5-3 No picture. Backlight and sound okay.



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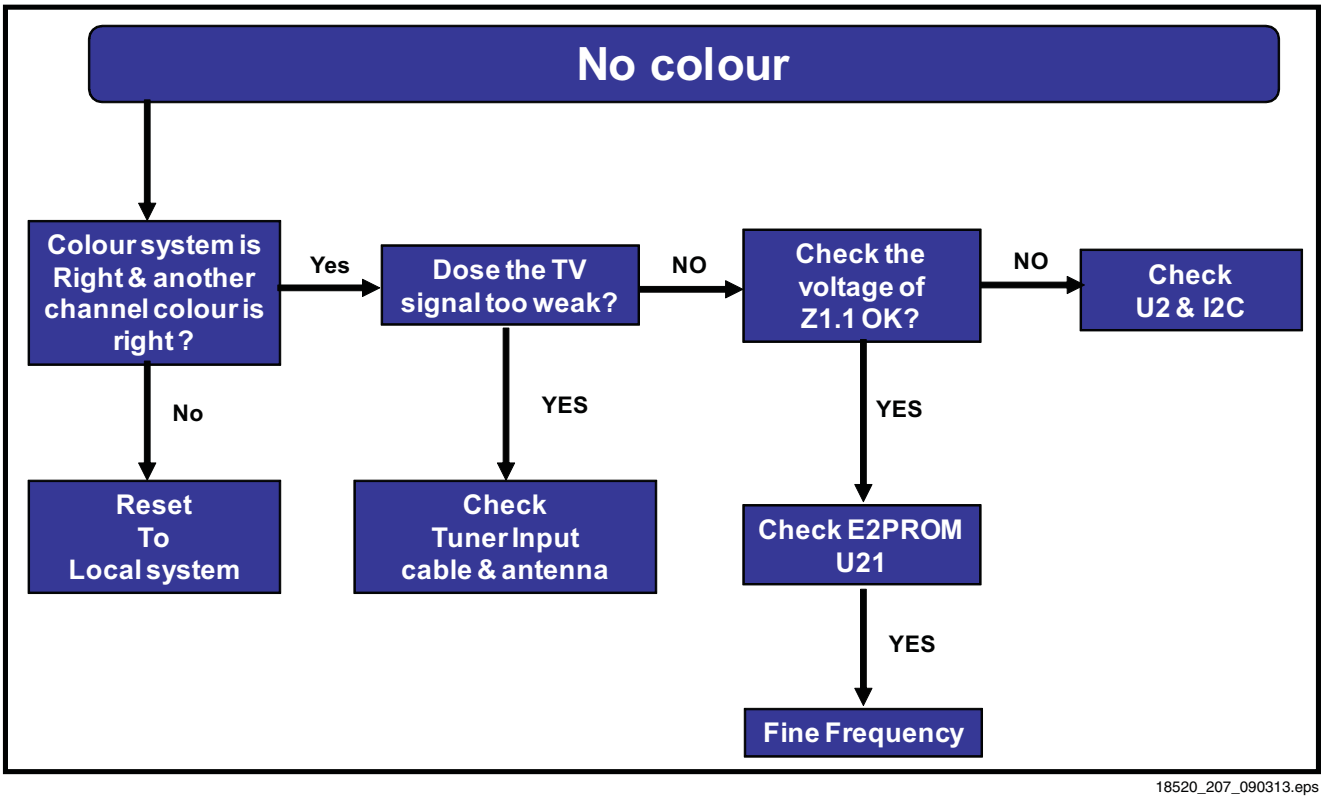
090313

Figure 5-4 Picture okay, no sound.



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090313

Figure 5-5 No colour.

5.7 Software Upgrading

5.7.1 Introduction

It is possible **for the user** to upgrade the **main** software via the USB port. A description on how to upgrade the main software can be found in the DFU and below.

5.7.2 Main Software Upgrade

In “normal” conditions, so when there is no major problem with the TV, the main software and the default software upgrade application can be upgraded with the “upgrade.bin”. This can also be done by the consumers themselves via the Software Update Assistant in the user menu (see DFU), but they will have to download their software from the commercial Philips website.

How to upgrade (see also figure 5-9 User SW upgrade flowchart):

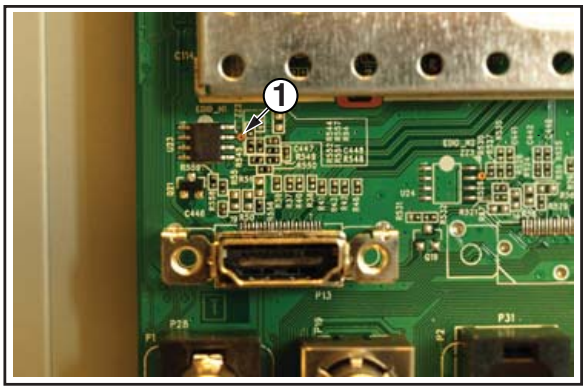
1. Copy the “upgrade.bin” file to the root of the USB stick.
2. Power “off” the TV and remove all memory devices.
3. Insert the USB stick that contains the downloaded software upgrade.
4. Switch “on” the TV, and activate the Main menu with the “Menu/House” key on the remote control.
5. In the Main menu, go to the “Software update” item.
6. Press “OK” key to go to the submenu.
7. Select “Local updates” in the submenu and press the “OK” key to enter the Software Update application.
8. You will be prompted to cancel or to proceed with the software updating.
9. To proceed, select “Update” and press the “OK” key to enter the next menu. In the next menu select “Start” and press “OK” key to start the software update.
10. Upgrading will now begin and the progress of the updating will be displayed. After the software updating is completed, the TV will automatically restart.

5.7.3 Stand-by Software Upgrade

In this chassis it is **not** possible to upgrade the Stand-by software via a USB stick or ComPair. Please order a pre-programmed device via the Philips Spare Part web portal.

5.7.4 Upgrade HDMI EDID NVM

To upgrade the HDMI EDID, pin 7 of the EDID NVM [1] has to be short circuited to ground. See **ComPair** for further instructions.



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090313

Figure 5-6 HDMI-1 EDID NVM

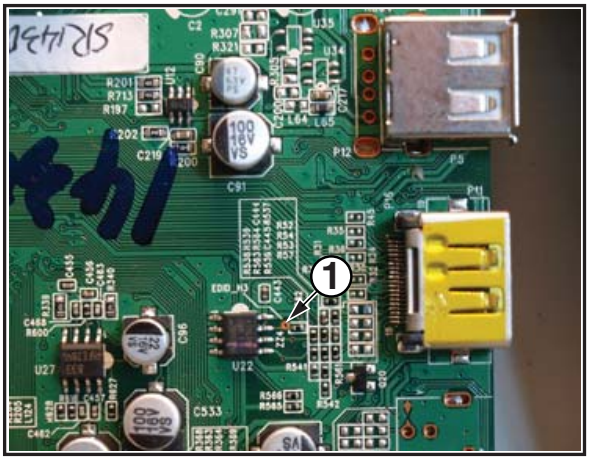

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Figure 5-7 HDMI-side EDID NVM

5.7.5 Upgrade VGA EDID NVM

To upgrade the VGA EDID NVM, pin 7 of the EDID NVM [2] has to be short circuited to ground. See **ComPair** for further instructions.

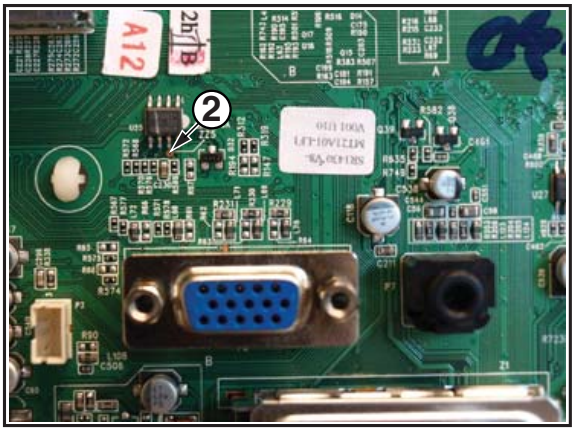

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Figure 5-8 VGA EDID NVM

5.7.6 Main SW upgrade flowchart.

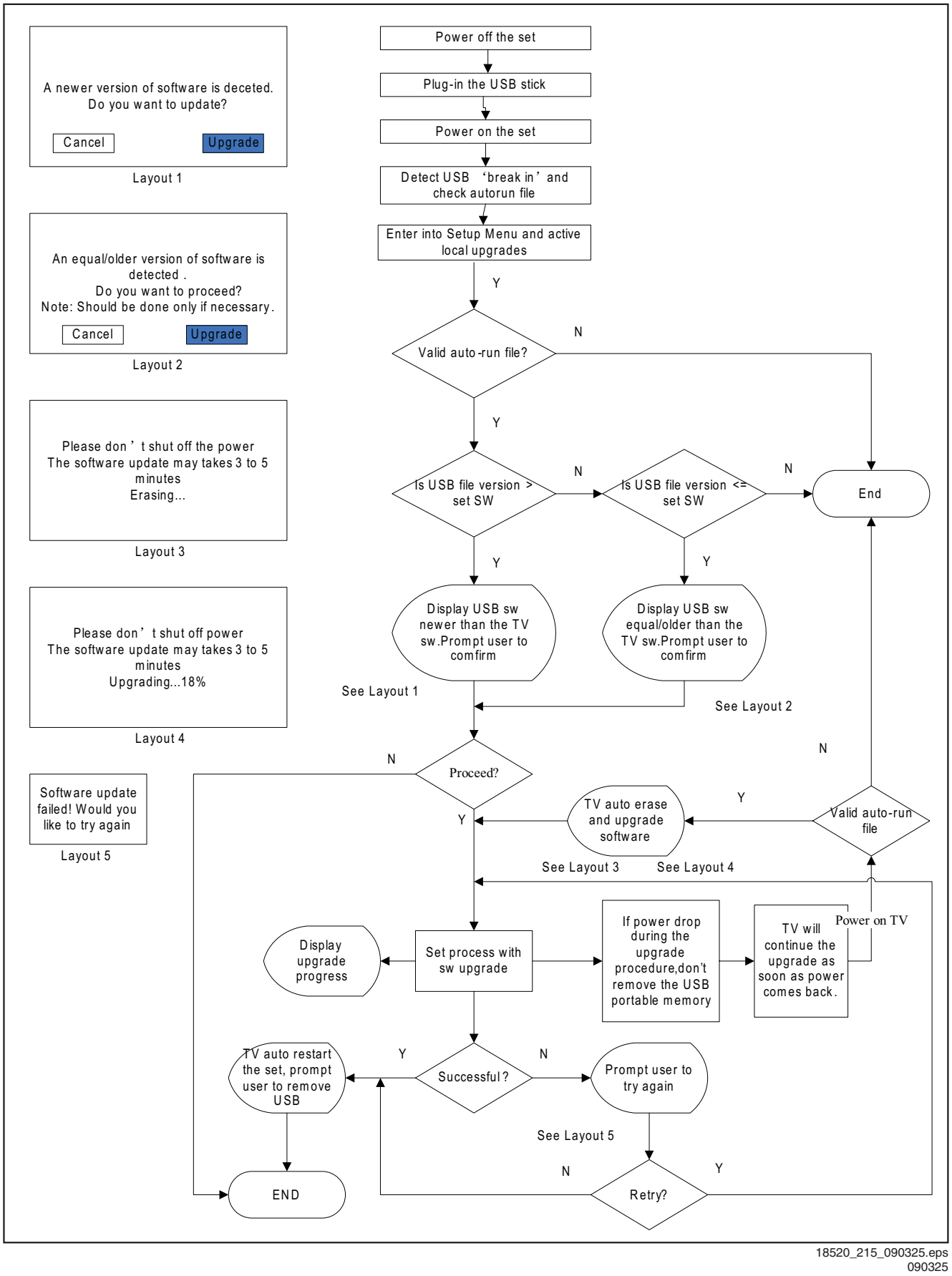
A newer version of software is deceted.
Do you want to update?
Cancel
Upgrade
Layout 1
An equal/older version of software is detected .
Do you want to proceed?
Note: Should be done only if necessary.
Cancel
Upgrade
Layout 2
Please don't shut off the power
The software update may takes 3 to 5 minutes
Erasing...
Layout 3
Please don't shut off power
The software update may takes 3 to 5 minutes
Upgrading...18%
Layout 4
Software update failed! Would you like to try again
Layout 5
Power off the set
Plug-in the USB stick
Power on the set
Detect USB 'break in' and check autorun file
Enter into Setup Menu and active local upgrades
Valid auto-run file?
Is USB file version > set SW
Is USB file version <= set SW
End
Display USB sw newer than the TV sw.Prompt user to comfirm
Display USB sw equal/older than the TV sw.Prompt user to comfirm
See Layout 1
See Layout 2
Proceed?
TV auto erase and upgrade software
Valid auto-run file
See Layout 3
See Layout 4
Display upgrade progress
Set process with sw upgrade
If power drop during the upgrade procedure,don't remove the USB portable memory
TV will continue the upgrade as soon as power comes back.
Power on TV
TV auto restart the set, prompt user to remove USB
Successful?
Prompt user to try again
See Layout 5
END
Retry?
Y
N

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Figure 5-9 User SW upgrade flowchart

6. Alignments

Index of this chapter:

6.1 General Alignment Conditions
6.2 Hardware Alignments
6.3 Software Alignments
6.4 Option Settings
6.5 Reset of Repaired SSB

6.1 General Alignment Conditions

Perform all electrical adjustments under the following conditions:

- Power supply voltage (depends on region):
  - **AP-NTSC:** 120 VAC or 230 V_{AC} / 50 Hz (± 10%).
  - **AP-PAL-multi:** 120 - 230 V_{AC} / 50 Hz (± 10%).
  - **EU:** 230 V_{AC} / 50 Hz (± 10%).
  - **LATAM-NTSC:** 120 - 230 V_{AC} / 50 Hz (± 10%).
  - **US:** 120 V_{AC} / 60 Hz (± 10%).
- Connect the set to the mains via an isolation transformer with low internal resistance.
- Allow the set to warm up for approximately 15 minutes.
- Measure voltages and waveforms in relation to correct ground (e.g. measure audio signals in relation to AUDIO_GND).
  Caution: It is not allowed to use heat sinks as ground.
- Test probe: Ri > 10 MΩ, Ci < 20 pF.
- Use an isolated trimmer/screwdriver to perform alignments.

6.1.1 Alignment Sequence

- First, set the correct options: see also section Option codes
- Warming up (>15 minutes).
- Start the alignments.

6.2 Hardware Alignments

Not applicable.

6.3 Software Alignments

Put the set in SAM mode (see chapter 5. Service Modes, Error Codes, and Fault Finding). The SAM menu will now appear on the screen. Select the appropriate alignment and go to one of the sub menus with the “arrow right” button. The alignments are explained below.
The following items can be aligned:

- Tuner AGC.
- White point.
- ADC calibration of VGA and YPbPr inputs.

To store the data:

- When displayed, select “Store” in the related sub menu and press the “OK” button on the RC. Screen text will change from “DO” to “OK”
- Press the MENU/House button on the RC.
- Switch the set to Stand-by mode.

For the next alignments, supply the following test signals via a video generator to the RF input:

- **EU/AP-PAL models:** a PAL B/G TV-signal with a signal strength of at least 1 mV and a frequency of 475.25 MHz
- **US/AP-NTSC models:** an NTSC M/N TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).
- **LATAM models:** an NTSC M TV-signal with a signal strength of at least 1 mV and a frequency of 61.25 MHz (channel 3).

6.3.1 Tuner AGC (RF AGC Take Over Point Adjustment)

Purpose: To keep the tuner output signal constant as the input signal amplitude varies.

The AGC alignment is done automatically (standard value: “12”). Store settings and exit SAM

6.3.2 White Point

- Press the “Menu/Home” button on the RC, and then select “Picture”. Set the picture settings as follows:

Picture Setting	
Smart Picture	Personal
Colour Temperature	Cool
Dynamic Contrast	Off
Dynamic Backlight	Off
Colour Enhancement	Off
Light Sensor	Off

- Activate SAM mode and select “RGB Align”.

White point alignment LCD screens:

- Use a 100% white screen on HDMI-1 as input signal and set the following values:
  - “Colour temperature”: “Cool”.
  - All “R/G/B_Gain” values to: “127”.
  - All “R/G/B_Offset” values to: “240”.

In case colour analyser can be used:

- Measure with a calibrated contactless colour analyser in the centre of the screen. Consequently, the measurement needs to be done in a dark environment.
- Adjust the correct x,y coordinates by means of decreasing the value of one or two other white points to the correct x,y coordinates (see Table 6-1). Tolerance dx, dy: ± 0.004. Only the “Cool” colour temperature needs to adjust.
- When finished, select “Store” in the “RGB Align” sub menu, and press “OK” on the RC to store the aligned values to the NVM.
- Restore the initial picture settings after the alignments.

Table 6-1 White D alignment values

Value	Cool (11000K)	Normal (9000K)	Warm (6500K)
x	0.278	0.289	0.314
y	0.278	0.291	0.319

In case no colour analyser is available, the default values can be used. This is the next best solution. The default values are average values coming from production.

- Select the “Cool” colour temperature.
- Set the RED, GREEN and BLUE default values according to the values in the “White tone default settings” table.
- When finished, select “Store” in the “RGB Align” sub menu, and press “OK” on the RC to store the aligned values to the NVM.
- Restore the initial picture settings after the alignments.

Table 6-2 White tone default settings

White Tone	32"			42"		
Colour Temp	R	G	B	R	G	B
Normal	auto adjusted					
Cool	175	151	168	176	150	170
Warm	auto adjusted					

(*) Default values were not available at the time of publishing. They will be published as soon as they become available.

6.3.3 Auto ADC

Purpose: For correct gray- and colour scale values of the VGA and YPbPr inputs.

How to align the **VGA/PC input**:
1. Provide a **1024 × 768 @ 60 Hz test signal with White/ Black squares** to the VGA input.
2. Select “Auto ADC” in the SAM menu.
3. Press the “Arrow right” button on the RC.
4. Press “OK” on the RC.
5. Wait until OSD shows “Auto ADC - OK”.

How to align the **YPbPr inputs (CVI-1 and CVI-2)**:
1. Provide a **1024 × 768 @ 60 Hz test signal with 100% 8 step colour bar** to the YPbPr input.
2. Rest is the same as for the VGA input.

6.4 Option Settings

6.4.1 Introduction

The microprocessor communicates with a large number of I^2C ICs in the set. To ensure good communication and to make digital diagnosis possible, the microprocessor has to know which ICs to address, and what brand and type of display is used.

6.4.2 Display code

Changing the display option code via a standard RC
Key in the code “0 6 2 5 9 8 MENU x x x” (where x x x is the 3 digit decimal display code of the used display *).
Tips:
- Keep the RC close to the IR receiver, and make sure the LED blinks when entering a code.
- Key in all codes in one sequence, without pauses.

If the above action is successful, the front LED will go out as an indication that the RC sequence was correct. After the display option is changed in the NVM, the TV will go to the Stand-by mode. If the NVM was corrupted or empty before this action, it will be initialized first (loaded with default values). This initializing can take up to 20 seconds.

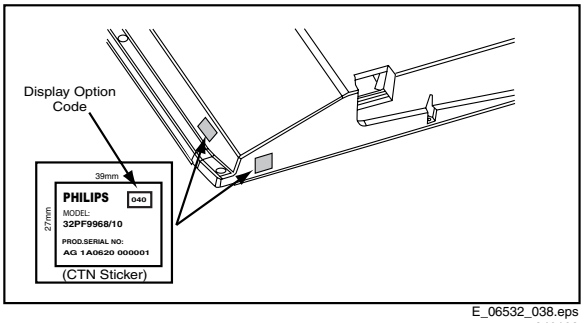

Figure 6-1 Location of Display Option Code sticker

(*) This display code can be found on the side sticker (see figure above) and/or on the rear sticker.

6.4.3 Option codes

Select this sub menu to set all options at once by selecting the correct model number. The so-called “Project ID” represents a number of different options, all related to that model number. By toggling the “arrow left/right” buttons on the RC, the correct model number can be selected.
- After changing the option (or Project ID), save it by leaving the sub menu via the “Menu/House” button on the RC.
- The new option setting is only active after the TV is switched “off/on” with the mains switch (the NVM is then read again).

6.5 Reset of Repaired SSB

When a repaired SSB will be used in an other TV, it is very important that the correct info is written into the NVM w.r.t. 12NC of the SSB, production serial number of the TV, 12NC of display and PSU, etc.
To set all this, the ComPair tool can be used, or the NVM can be edited directly via the NVM editor (in SAM). Find below the addresses of these items. Use the decimal values.
In case of a display replacement, reset the “Operation hours” to “0”, or to the operation hours of the replacement display.

Table 6-3 NVM addresses of “reset items”

Item	NVM Address (decimal)
Display code	3195
Production serial number	3196 - 3211 (16 bytes)
SSB 12NC	3212 - 3225 (16 bytes)
Display 12NC	3228 - 3243 (16 bytes)
PSU 12NC	3244 - 3259 (16 bytes)
Model Number	3260 - 3275 (16 bytes)
Operational hours	not available at the time of publishing

7. Circuit Descriptions

Index of this chapter:

7.1 Introduction
7.3 Power Supply
7.2 Video and Audio Processing - MT822x

Notes:

- Only **new** circuits (circuits that are not published recently) are described.
- Figures can deviate slightly from the actual situation, due to different set executions.
- For a good understanding of the following circuit descriptions, please use the wiring, block (see chapter 9. Block Diagrams) and circuit diagrams (see chapter 10. Circuit Diagrams and PWB Layouts). Where necessary, a separate drawing for clarification is given.

7.1 Introduction

Key components of this chassis are:

- MT8221 Mediatek Scaler IC.
- R8C11Renesas Stand-by microprocessor.
- TEDE8 Tuner.
- TDA9886 IF Demodulator.
- WM8501 D/A Converter.
- STA333BW Audio Amplifier.

7.1.1 Architecture Overview

- For details about the chassis block diagrams refer to chapter 9. Block Diagrams. An overview of the MT8221 architecture can be found in Figure 7-1.

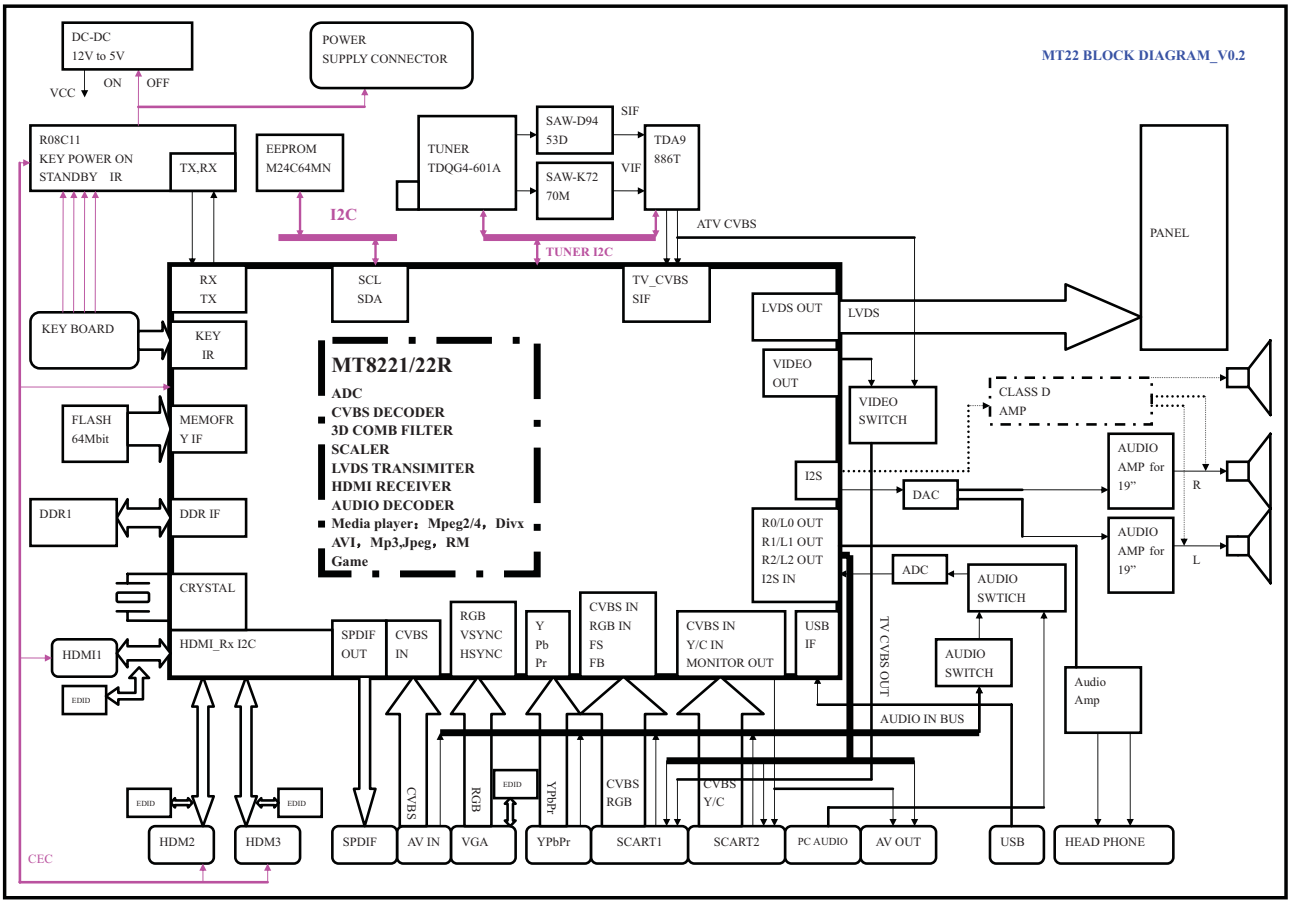

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Figure 7-1 Block diagram of MT822x

7.2 Video and Audio Processing - MT822x

The MediaTek MT822x is an ultra high integrated single chip for flat panel TV. It supports multimedia video/audio input and output format up to full HDTV.
It includes an advanced 3D comb filter/TV decoder to retrieve the best image from popular composite signals and embedded HDTV/VGA decoders for high bandwidth input signals.
The new 4th generation advanced motion adaptive and motion estimation de-interlacer converts accordingly the interlaced video into a progressive one with overlay of a 2D graphic processor.
Independent two flexible scalers provide wide adoption to various LCD panels for two different video sources at the same time.
The on-chip audio processor decodes the analogue signals from the tuner with lip sync control, delivering high quality post-processed sound effects to the audio amplifier stage.
An on-chip microprocessor reduces the system BOM and shortens the schedule of UI design by high level C programming.

7.3 Power Supply

All power supplies used in this chassis are a “black box” for Service. When defective, a new board must be ordered and the defective one must be returned, unless the main fuse of the board is broken. Always replace a defective fuse with one with the correct specifications! This part is available in the regular market.

Consult the Service Spare Part portal for the order codes of these boards.

Below some background info on the PSUs is given, to ease the troubleshooting process in case of power supply problems

7.3.1 Diversity

The only type of power supply used in this platform is the Integrated Power Board (IPB) - incl. LCD backlight inverters.

Below find an overview of the different PSUs that are used:

Table 7-1 Supply diversity

Supplier	PSU	Model	Input Voltage Range
TCL	IPL32L	32" LG display	100 - 240 Vac
	IPL42A	42" AUO display	
	IPL42L	42" LG display	

It should be noted that for different display manufacturers, different PSUs can be used. When ordering a new PSU, always check which LCD panel is used in the set, and order the correct PSU!

7.3.2 IPL32L PSU

Block Diagram

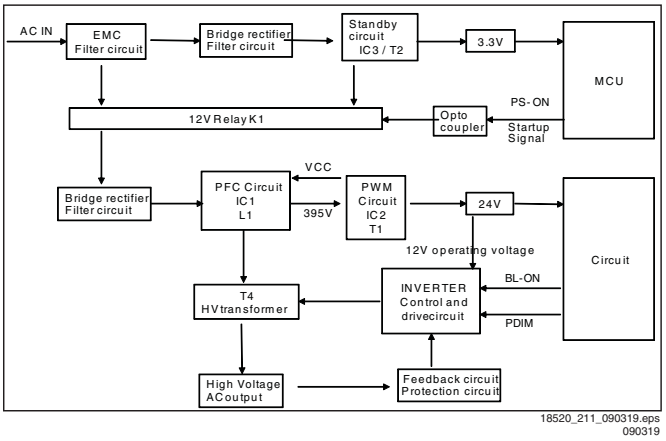


Figure 7-2 Block diagram IPL32L PSU

Key Components

The key component ICs are:

- Stand-by power supply IC: FSQ510 (Fairchild).
- PFC control IC: L6563 (ST).
- 24V PWM control IC: FA5571N (FUJI).
- Inverter high voltage control IC: OZ9976 (O2).

Control Signals

Table 7-2 Control signals

Control signal	Comments	Output
PS-ON	3.3V >= ON >= 2.0V	AC power output ON
	0.7V >= OFF >= 0V	AC power output OFF
BL_ON	5.0V >= ON >= 2.0V	The inverter is working
	1.0V >= OFF >= 0V	The inverter is switched OFF
DIMP	High level: 2V ~ 5.0V	HD: OPC dimming, 140Hz
	Low level: 0V ~ 0.7V	FHD: PWM, 103.4Hz

Output Characteristics

Table 7-3 Output characteristics

Output Voltage	Tolerance	Min. current	Max. current	Load regulation
+3V3(STB)	+/- 3%	5 mA	200 mA	+/- 5%
24V	+/- 5%	0.2 A	2.0 A	+/- 5%

Fault Finding

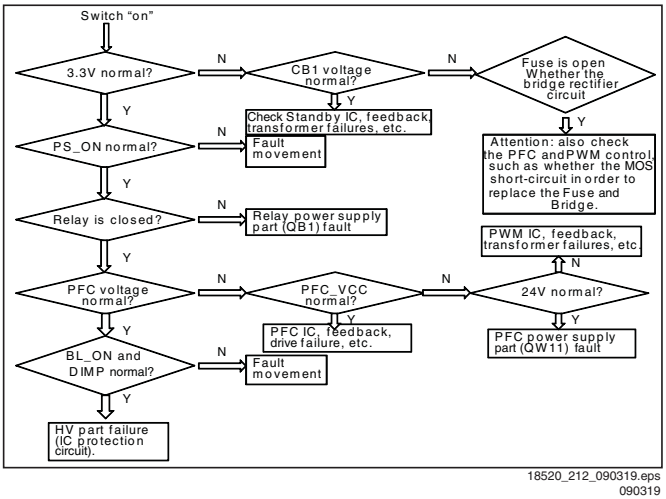


Figure 7-3 Fault finding diagram IPL32L PSU

7.3.3 IPL42L PSU

Block Diagram

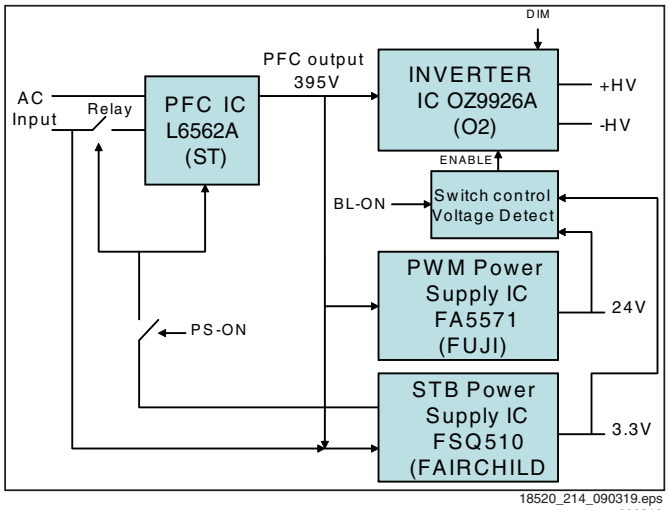


Figure 7-4 Block diagram IPL42L PSU

Key Components

The key component ICs are:

- Stand-by power supply IC: FSQ510 (Fairchild).
- PFC control IC: L6562 (ST).
- 24V PWM control IC: FA5571N (FUJI).
- Inverter high voltage control IC: OZ9926 (O2).

Control Signals

Table 7-4 Control signals

Control signal	Comments	Output
PS-ON	5.0V >= ON >= 2.0V	AC power output ON
	1.0V >= OFF >= 0V	AC power output OFF
BL_ON	5.0V >= ON >= 2.0V	The inverter is working
	1.0V >= OFF >= 0V	The inverter is switched OFF
Burst dimming freq. / duty	100 - 200 Hz / 10 - 100%	
PWM Dimming	High level: 2V ~ 5.0V	
	Low level: 0V ~ 0.7V	

Output Characteristics

Table 7-5 Output characteristics

Output Voltage	Tolerance	Min. current	Max. current	Load regulation
+3V3	+/- 5%	5 mA	300 mA	+/- 5%
24V	+/- 5%	0.5 A	2.5 A	+/- 5%

Fault Finding

Normal PSU working order:

- Connect the 220V AC power plug.
- The 3.3V Stand-by power supply (Stand-by uP U801) will start. This is a “single-ended flyback regulator”. For a good functioning of this part, check the availability of 1.25V on U803 (TL431).
- On connector P802, signal line “PS_ON” will go “high” (3V3) and relay K801 will be activated.
- Also capacitors C811/C812 will be charged, supplying IC806 with electricity. This will start the PFC circuit and generate the +24 V control.
- Now, IC805 will start, and will generated the 24V output.
- On connector P802, signal “DIM” sets the PWM dimming status.
- On connector P802, when signal “BL-ON” goes “high”, the high voltage Inverter (IC901, OZ9926A) will start.

8. IC Data Sheets

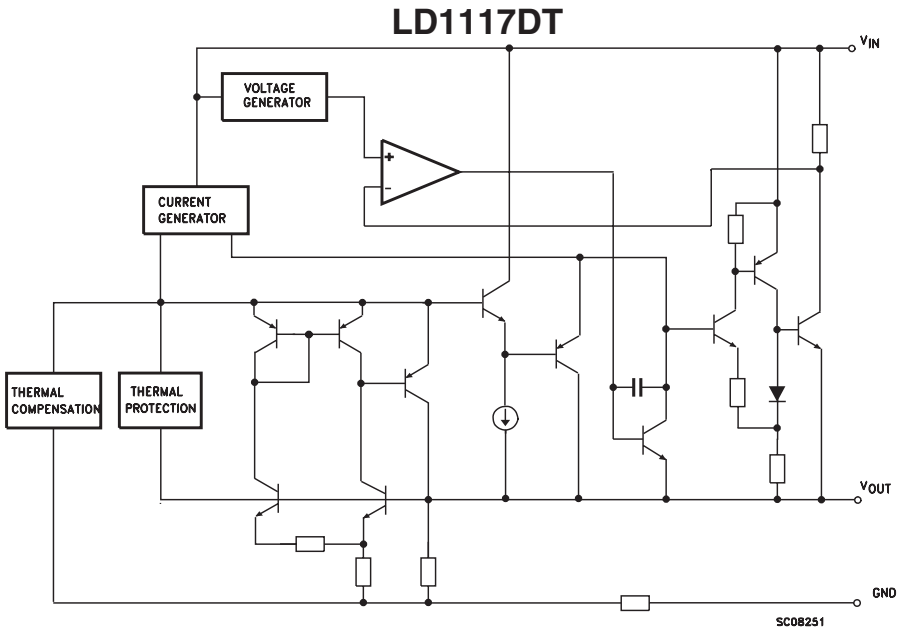
Index of this chapter:

8.1 Diagram B01, LD1117 (IC U4)
8.2 Diagram B01, RT8110 (IC U13)
8.3 Diagram B01, MP1593 (IC U14)
8.4 Diagram B01, PQ1CX41 (IC U20)
8.5 Diagram B02, MX25L3205 (IC U10)
8.6 Diagram B02, MT8221 (IC U11)
8.7 Diagram B03, RT9199 (IC U1)
8.8 Diagram B04, TDA9885 (IC U2)
8.9 Diagram B07, WM8501 (IC U9)
8.10 Diagram B09, RC4558 (IC U26/U37)
8.11 Diagram B09, LM833D (IC U27)
8.12 Diagram B10, STA333BW (IC U17)

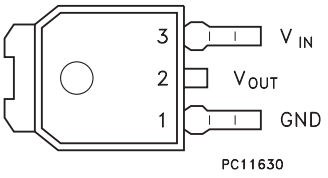
This chapter shows the internal block diagrams and pin configurations of ICs that are drawn as “black boxes” in the electrical diagrams (with the exception of “memory” and “logic” ICs).

8.1 Diagram B01, LD1117 (IC U4)

Block Diagram



Pin Configuration



DPAK

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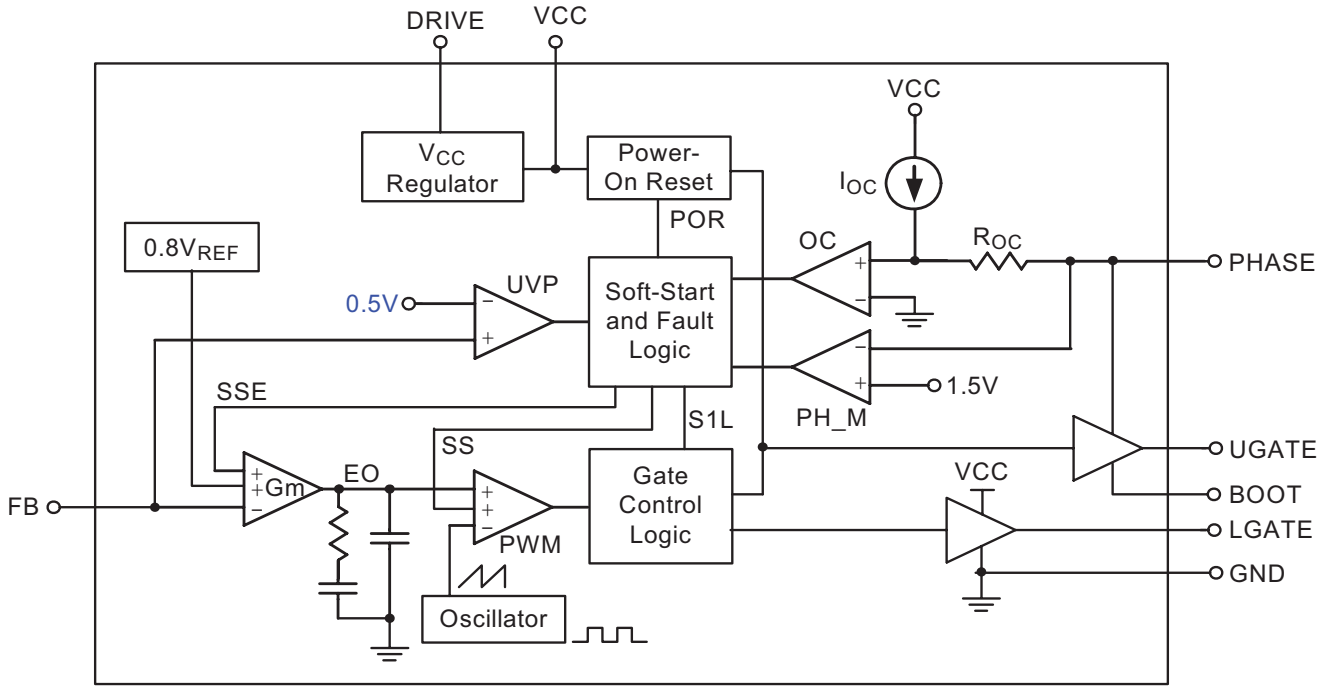
230905

Figure 8-1 Internal block diagram and pin configuration

8.2 Diagram B01, RT8110 (IC U13)

Block Diagram



Pin Configuration

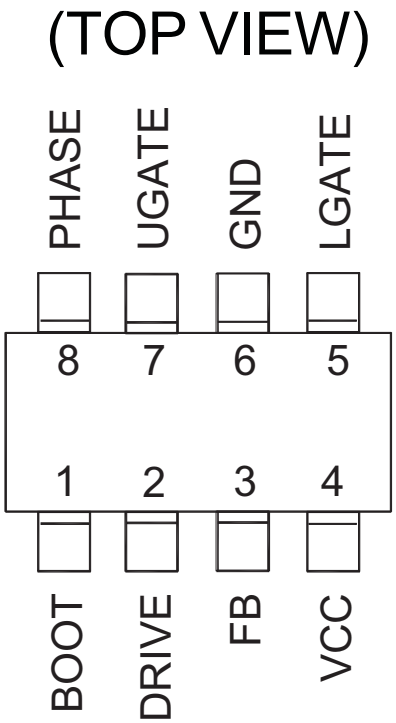


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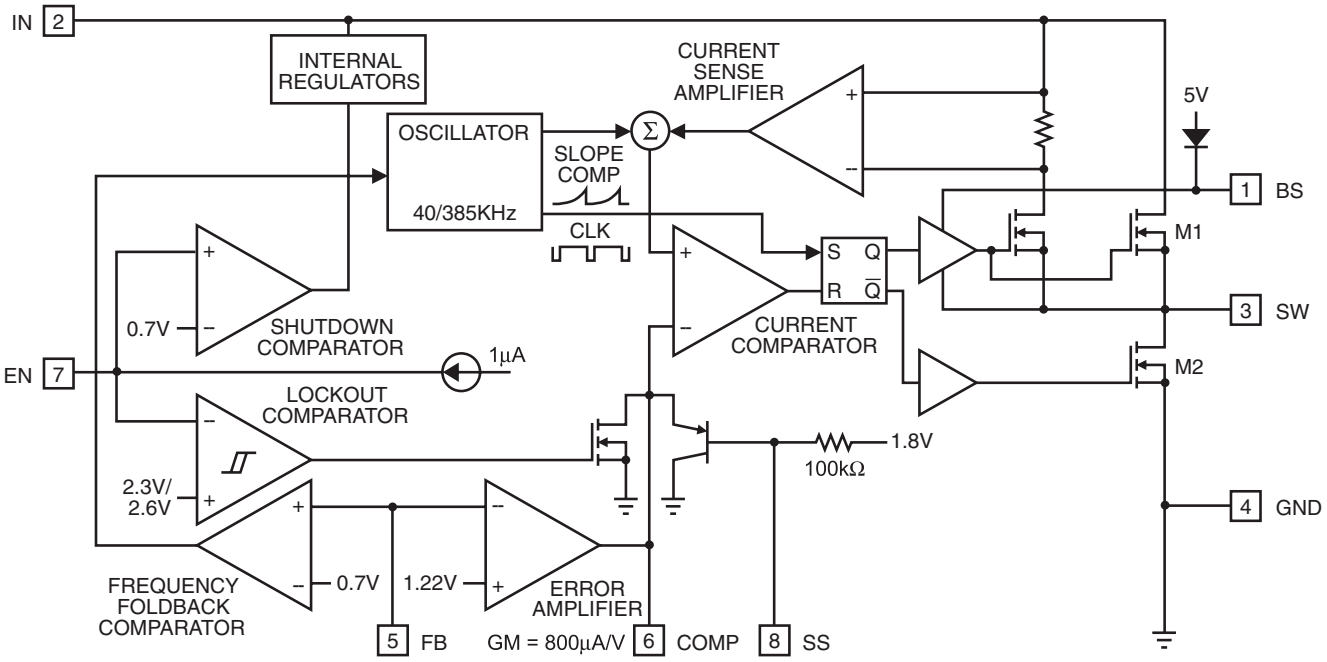
Figure 8-2 Internal block diagram and pin configuration

8.3 Diagram B01, MP1593 (IC U14)

Block Diagram



Pin Configuration

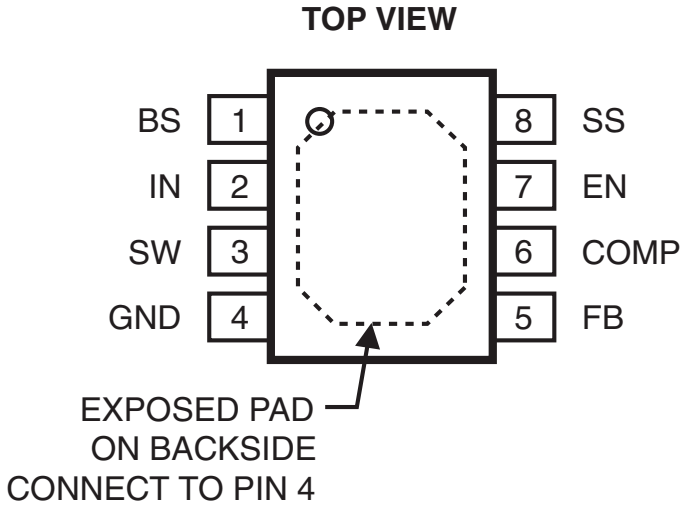


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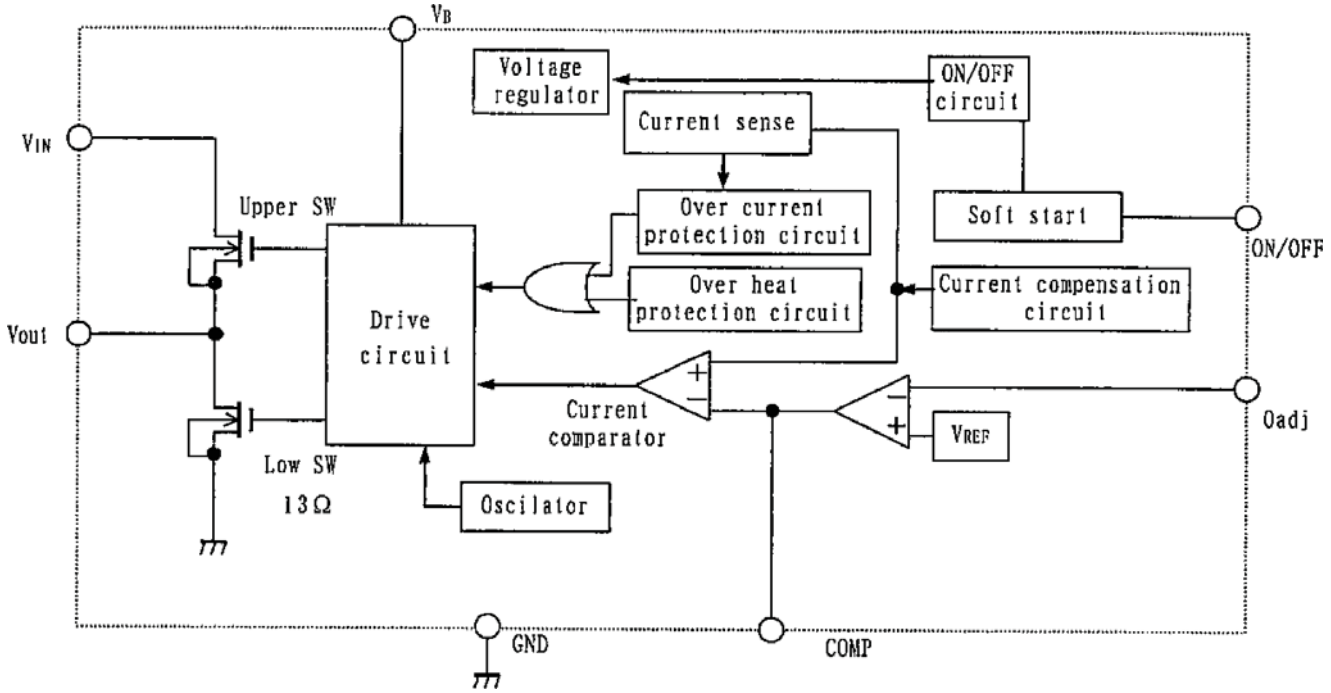
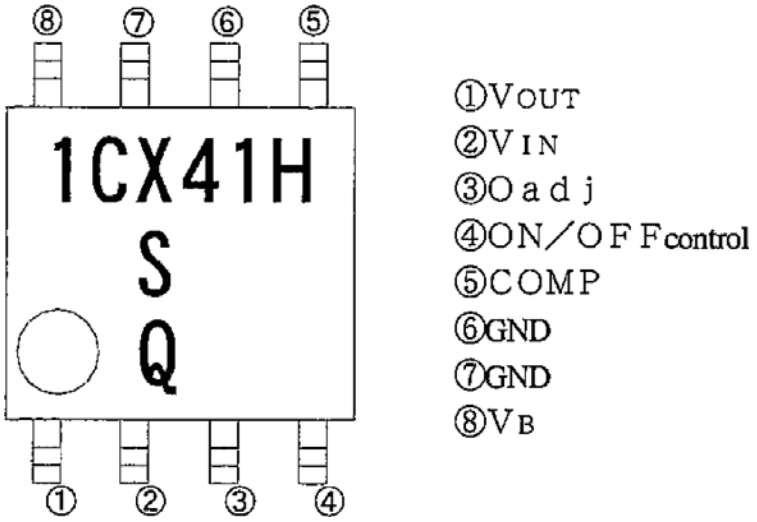
Figure 8-3 Internal block diagram and pin configuration

8.4 Diagram B01, PQ1CX41 (IC U20)

Block Diagram



Pin Configuration



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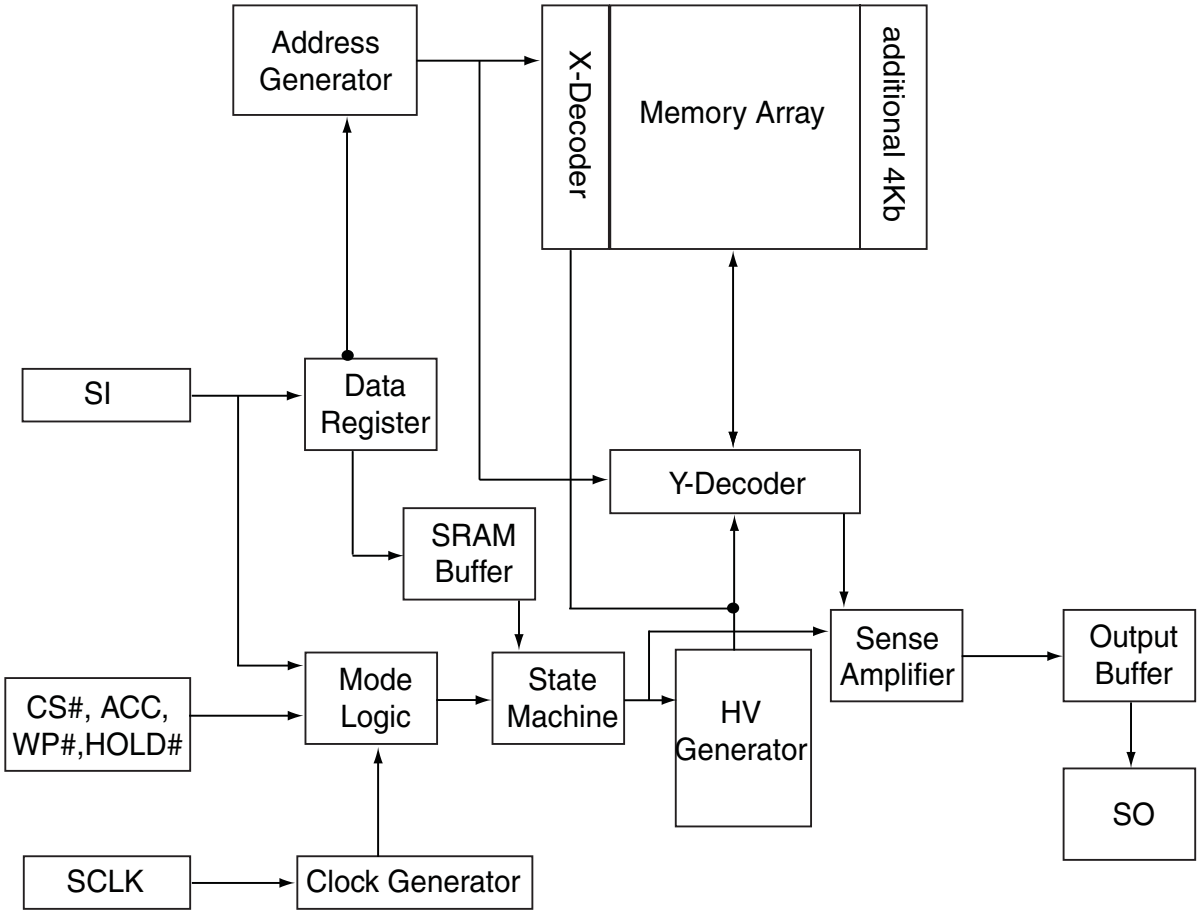
090327

Figure 8-4 Internal block diagram and pin configuration

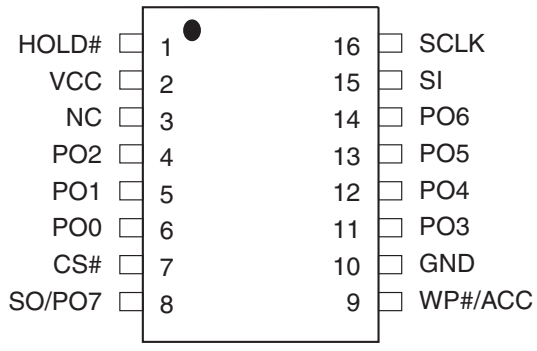
8.5 Diagram B02, MX25L3205 (IC U10)

Block Diagram



Pin Configuration

16-PIN SOP (300 mil)



PIN DESCRIPTION

SYMBOL	DESCRIPTION
CS#	Chip Select
SI	Serial Data Input
SO/PO7(1)	Serial Data Output or Parallel Data output/input
SCLK	Clock Input
HOLD#(2)	Hold, to pause the serial communication (HOLD# is not for parallel mode)
WP#/ACC	Write Protection: connect to GND; 12V for program/erase acceleration: connect to 12V
VCC	+ 3.3V Power Supply
GND	Ground
PO0~PO6	Parallel data output/input (PO0~PO6 can be connected to NC in serial mode)
NC	No Internal Connection

Note:
1. PO0~PO7 are not provided on 8-LAND SON package.
2. HOLD# is recommended to connect to VCC during parallel mode.

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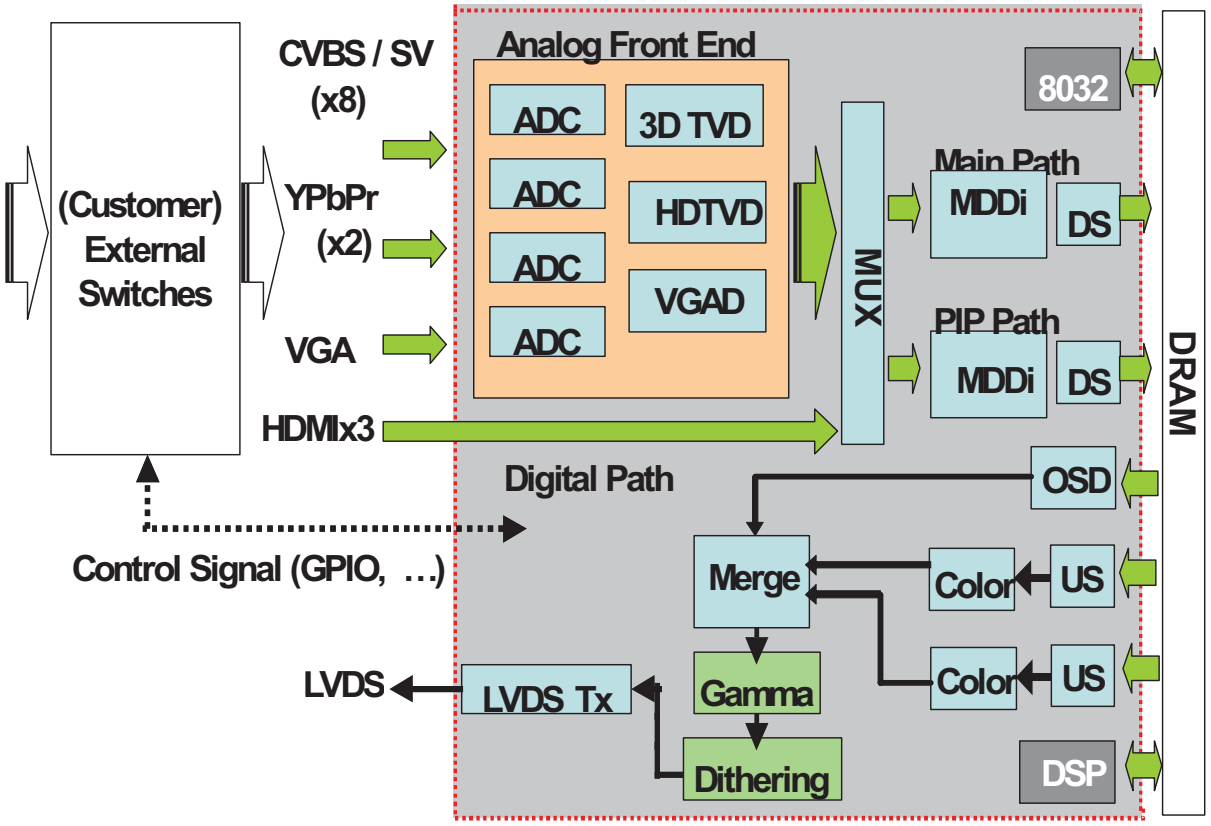
090325

Figure 8-5 Internal block diagram and pin configuration

8.6 Diagram B02, MT8221 (IC U11)



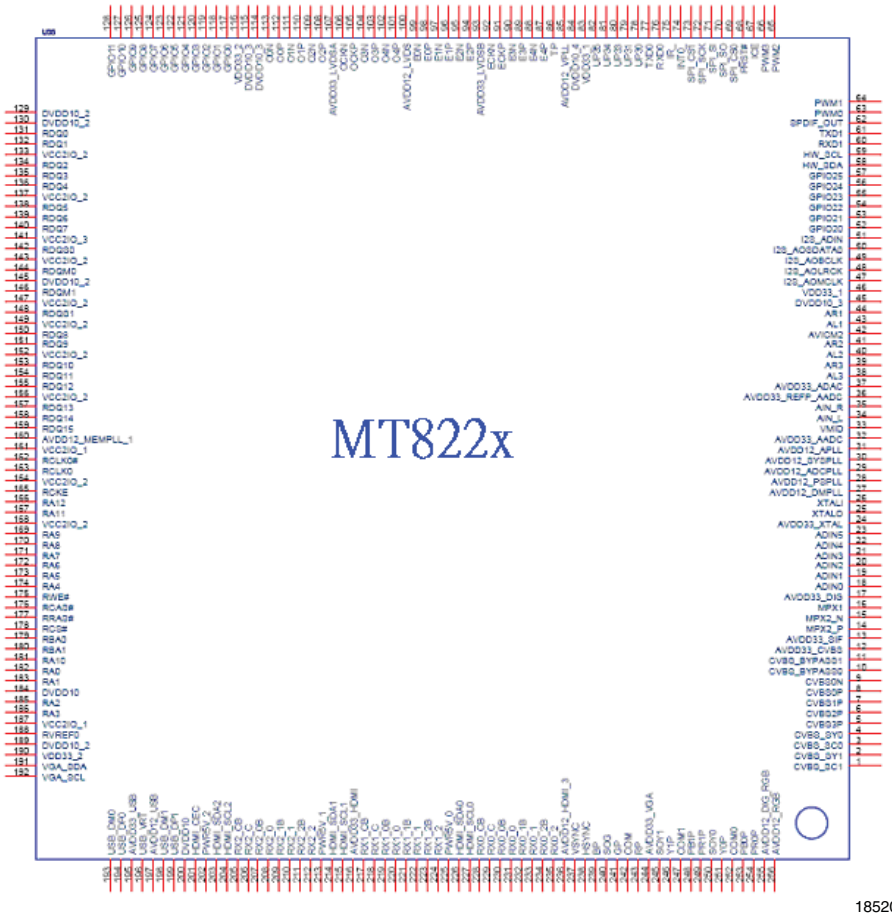


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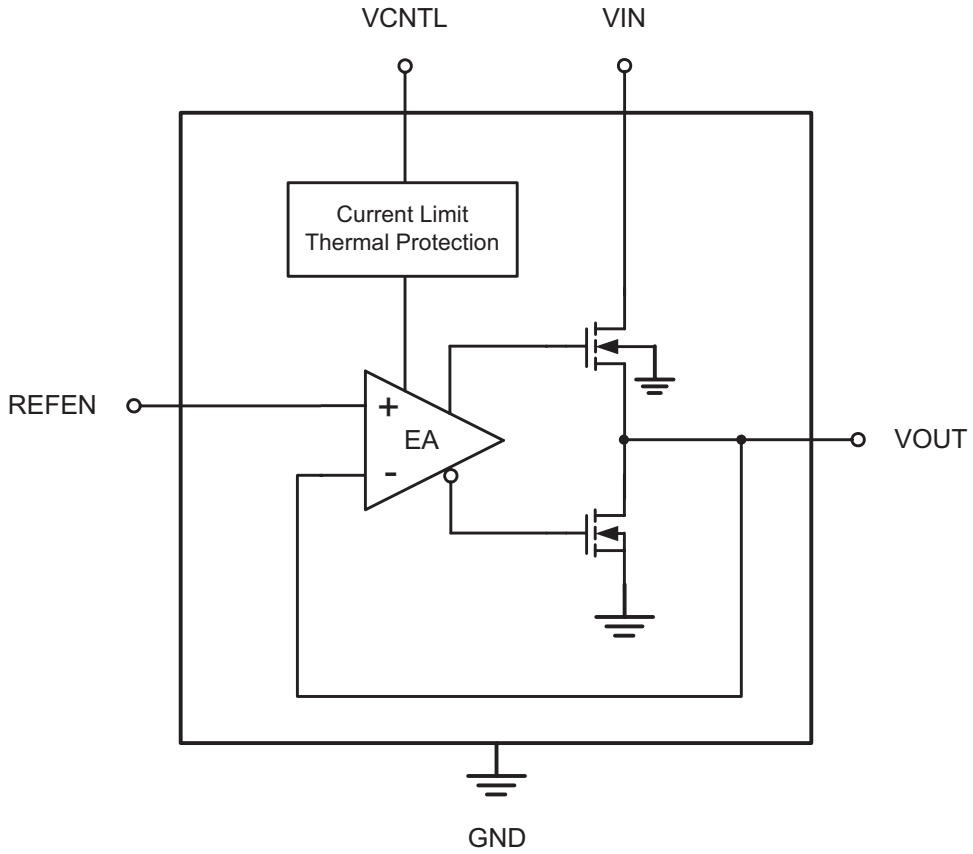
Figure 8-6 Internal block diagram and pin configuration

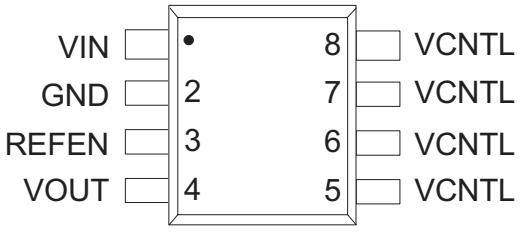
8.7 Diagram B03, RT9199 (IC U1)

Block Diagram

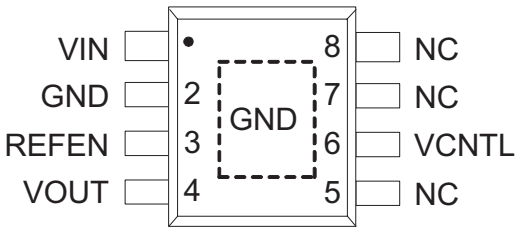


Pin Configuration

(TOP VIEW)



SOP-8



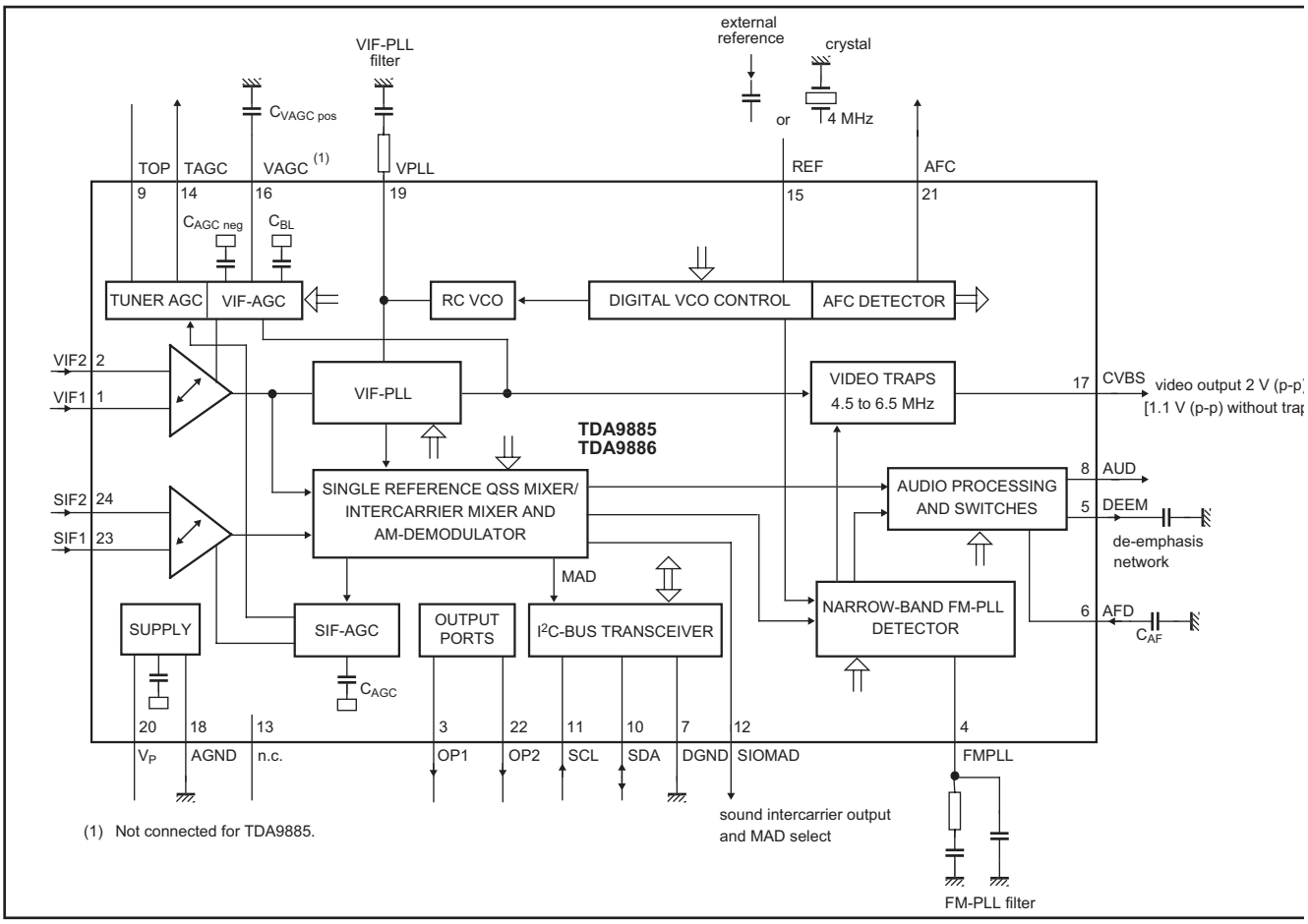
SOP-8 (Exposed Pad)

18520_314_090327.eps
090327

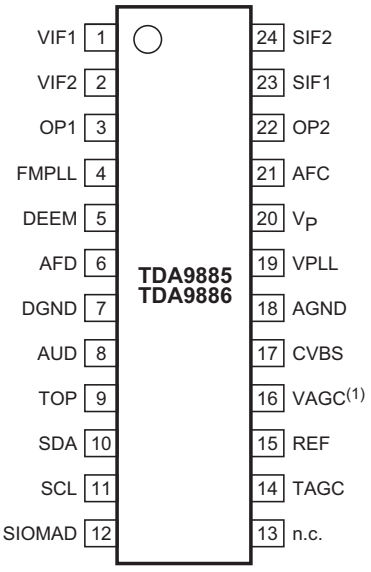
Figure 8-7 Internal block diagram and pin configuration

8.8 Diagram B04, TDA9885 (IC U2)

Block Diagram



Pin Configuration

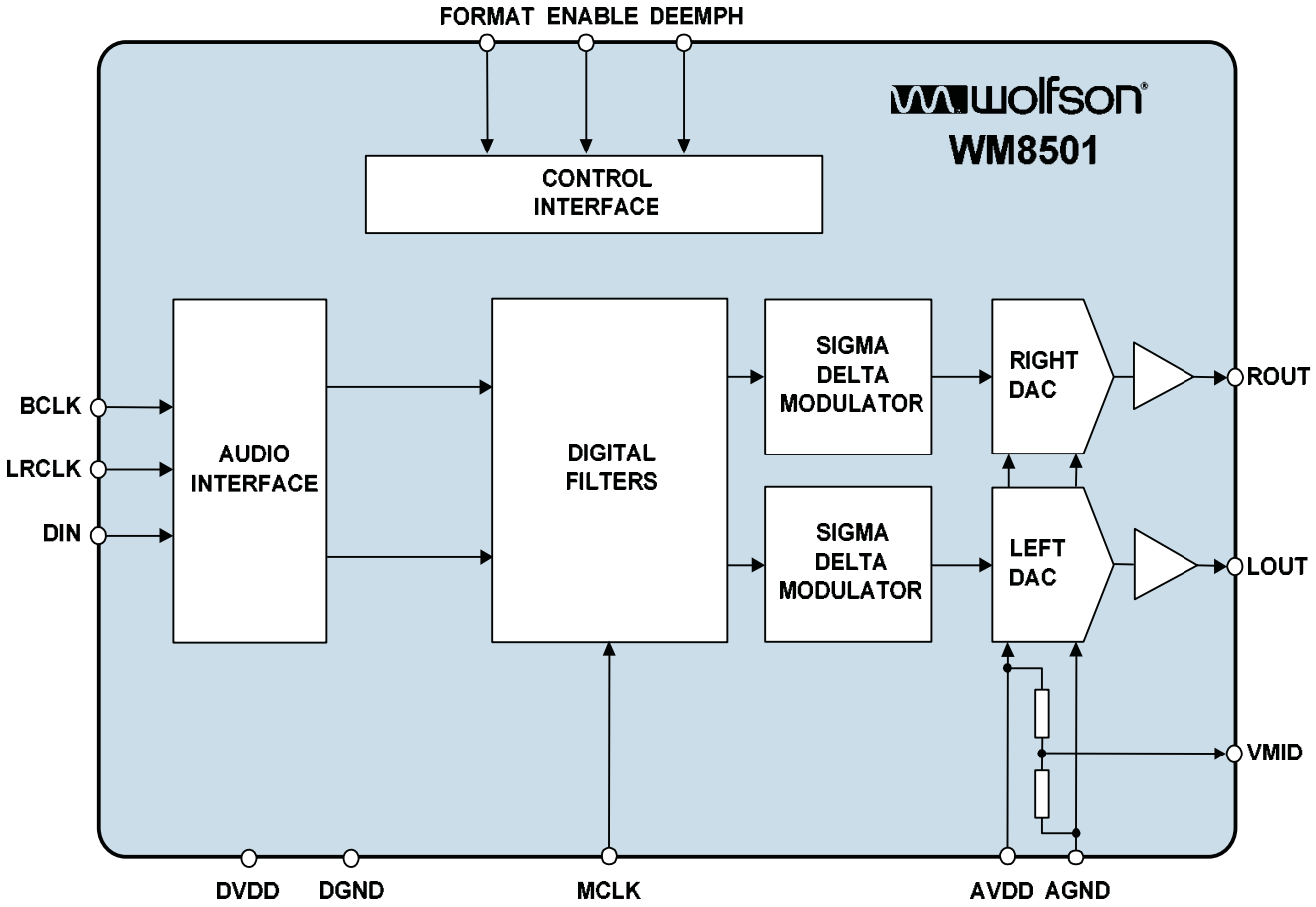


G_16510_

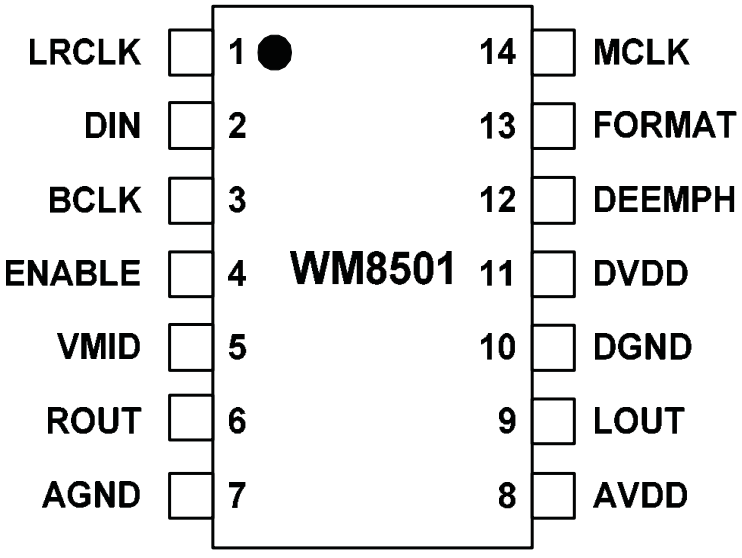
Figure 8-8 Internal block diagram and pin configuration

8.9 Diagram B07, WM8501 (IC U9)

Block Diagram



Pin Configuration



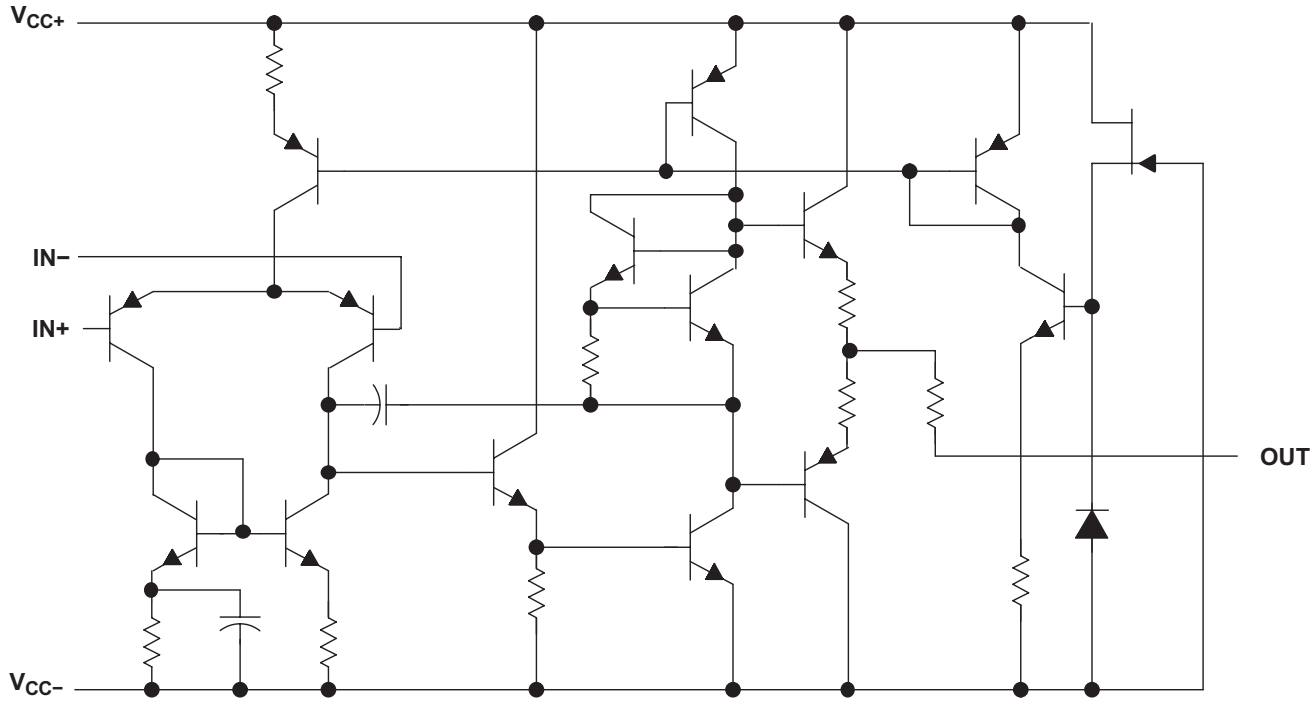
18520_311_090325.eps
090325

Figure 8-9 Internal block diagram and pin configuration

8.10 Diagram B09, RC4558 (IC U26/U37)

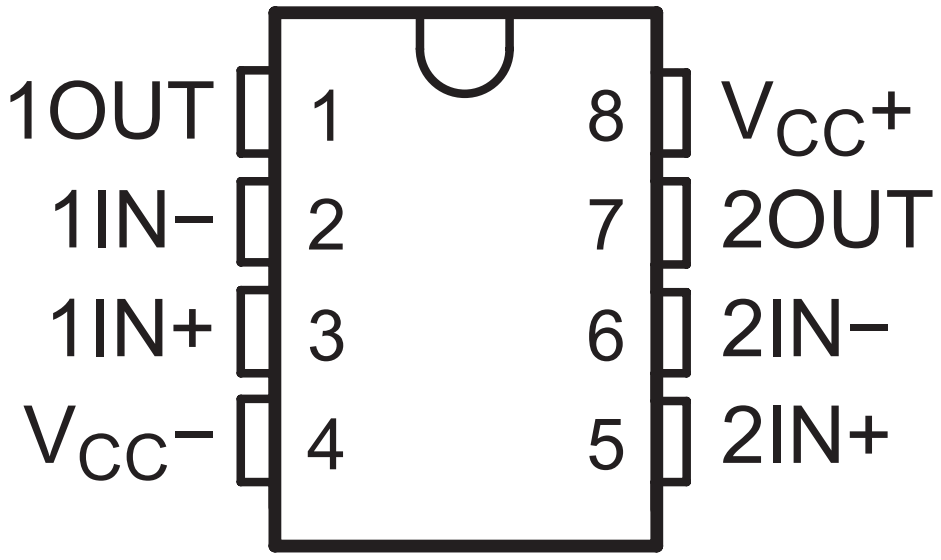
Block Diagram

SCHEMATIC (EACH AMPLIFIER)



Pin Configuration

(TOP VIEW)



18520_309_090325.eps
090326

Figure 8-10 Internal block diagram and pin configuration

8.11 Diagram B09, LM833D (IC U27)

Pin Configuration

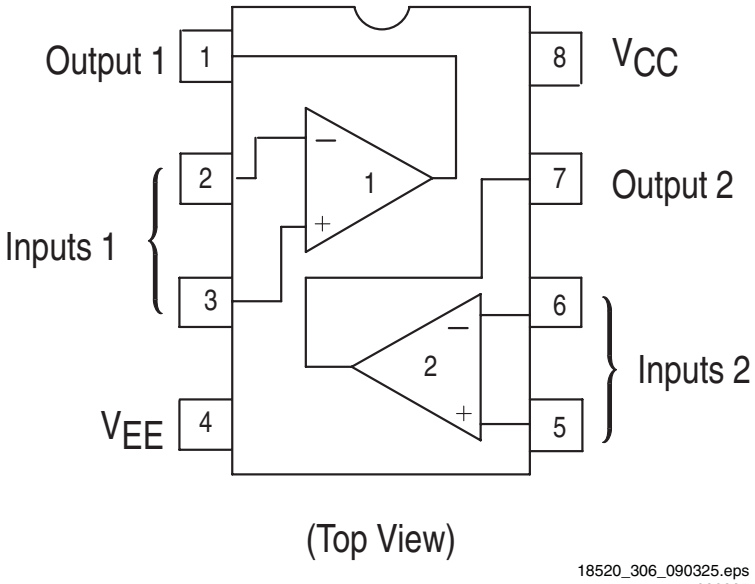
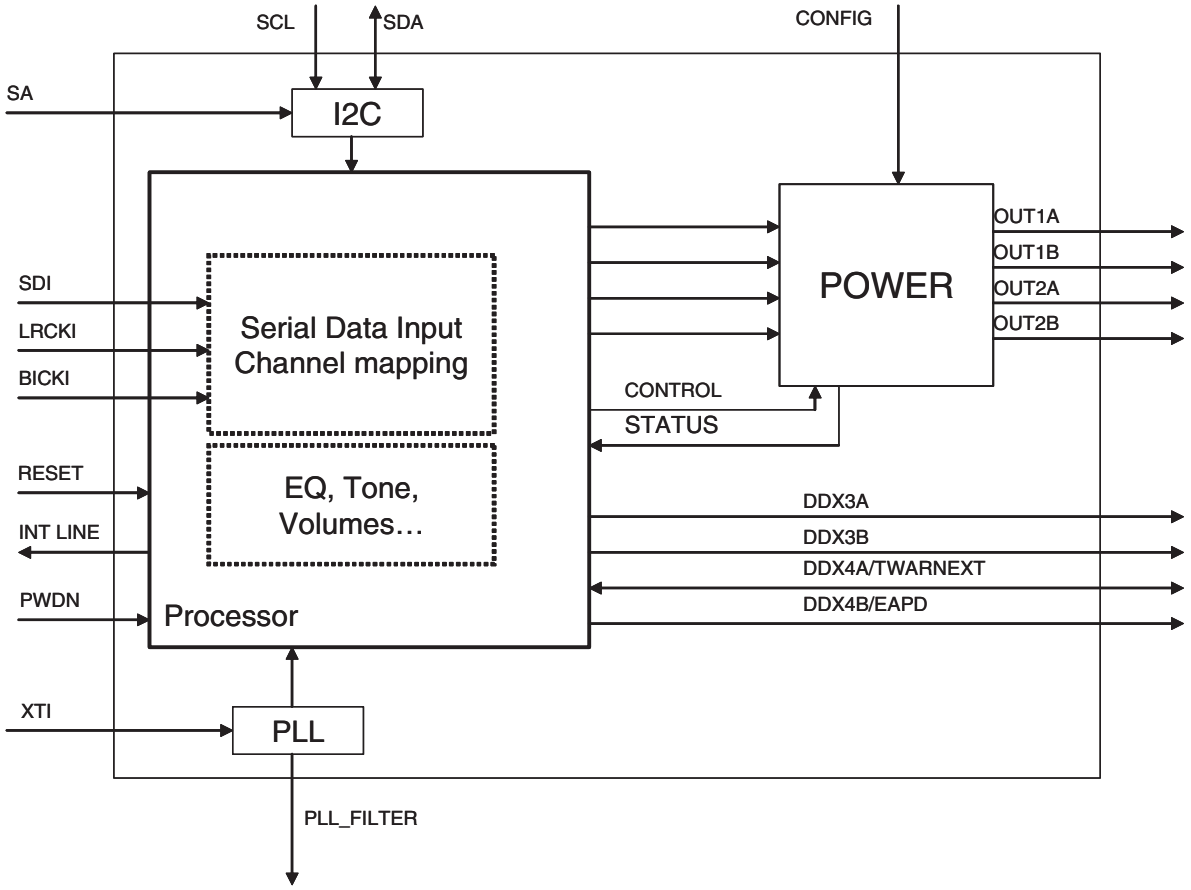


Figure 8-11 Internal block diagram and pin configuration

8.12 Diagram B10, STA333BW (IC U17)

Block Diagram



Pin Configuration

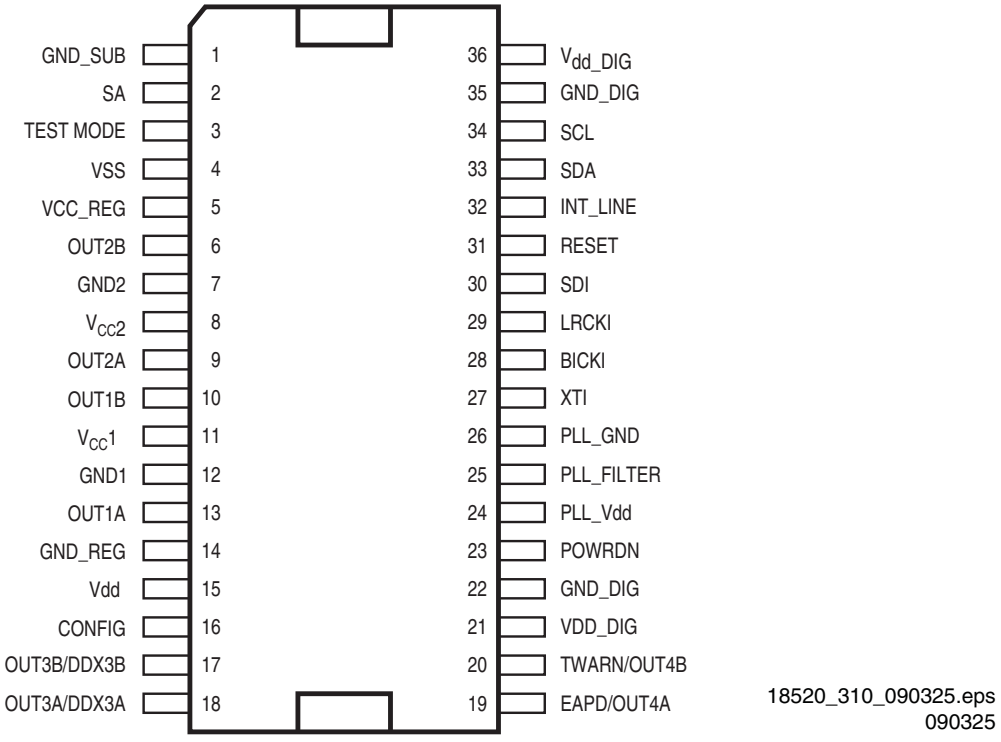
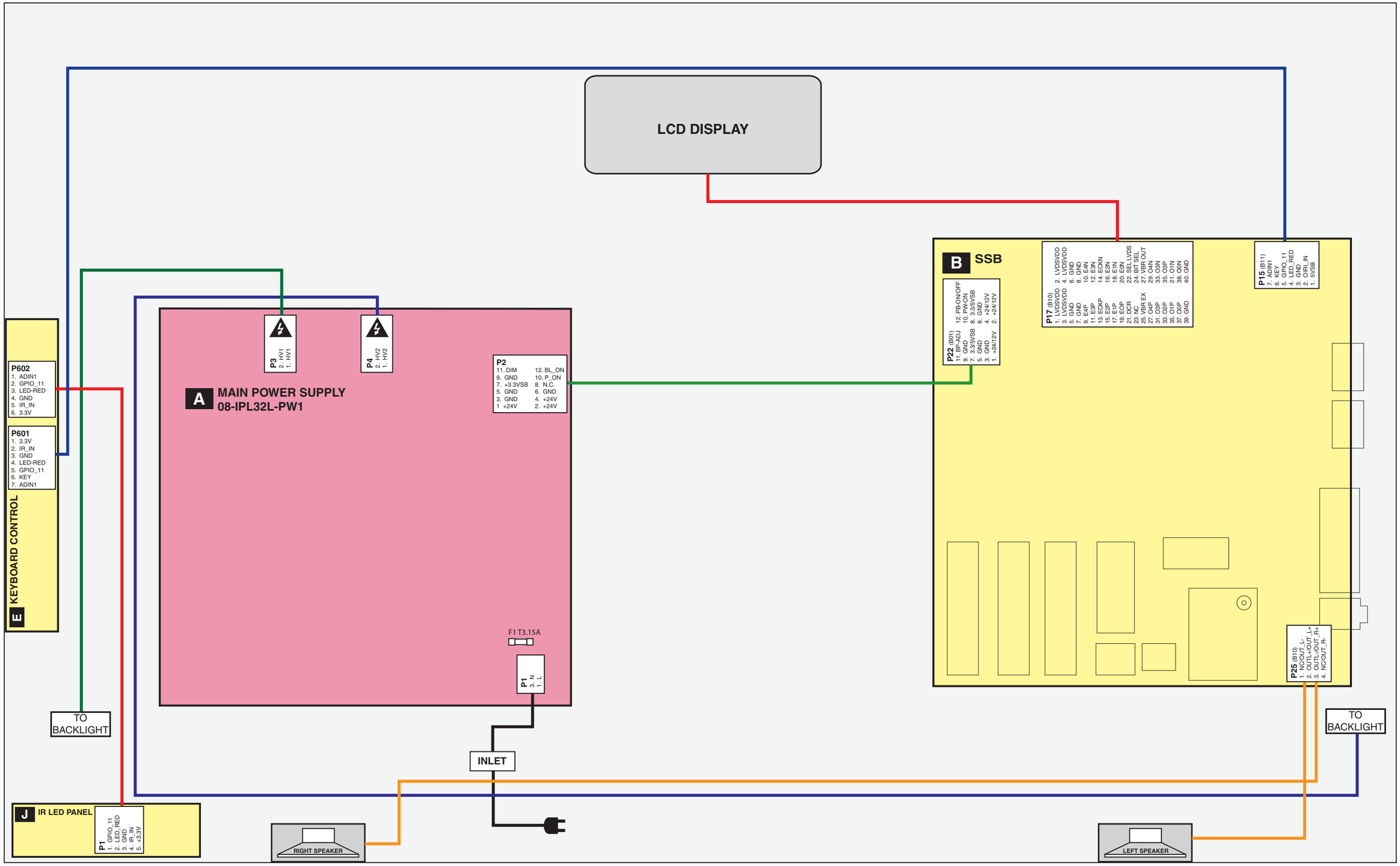


Figure 8-12 Internal block diagram and pin configuration

9. Block Diagrams

Wiring Diagram 32" (Click)

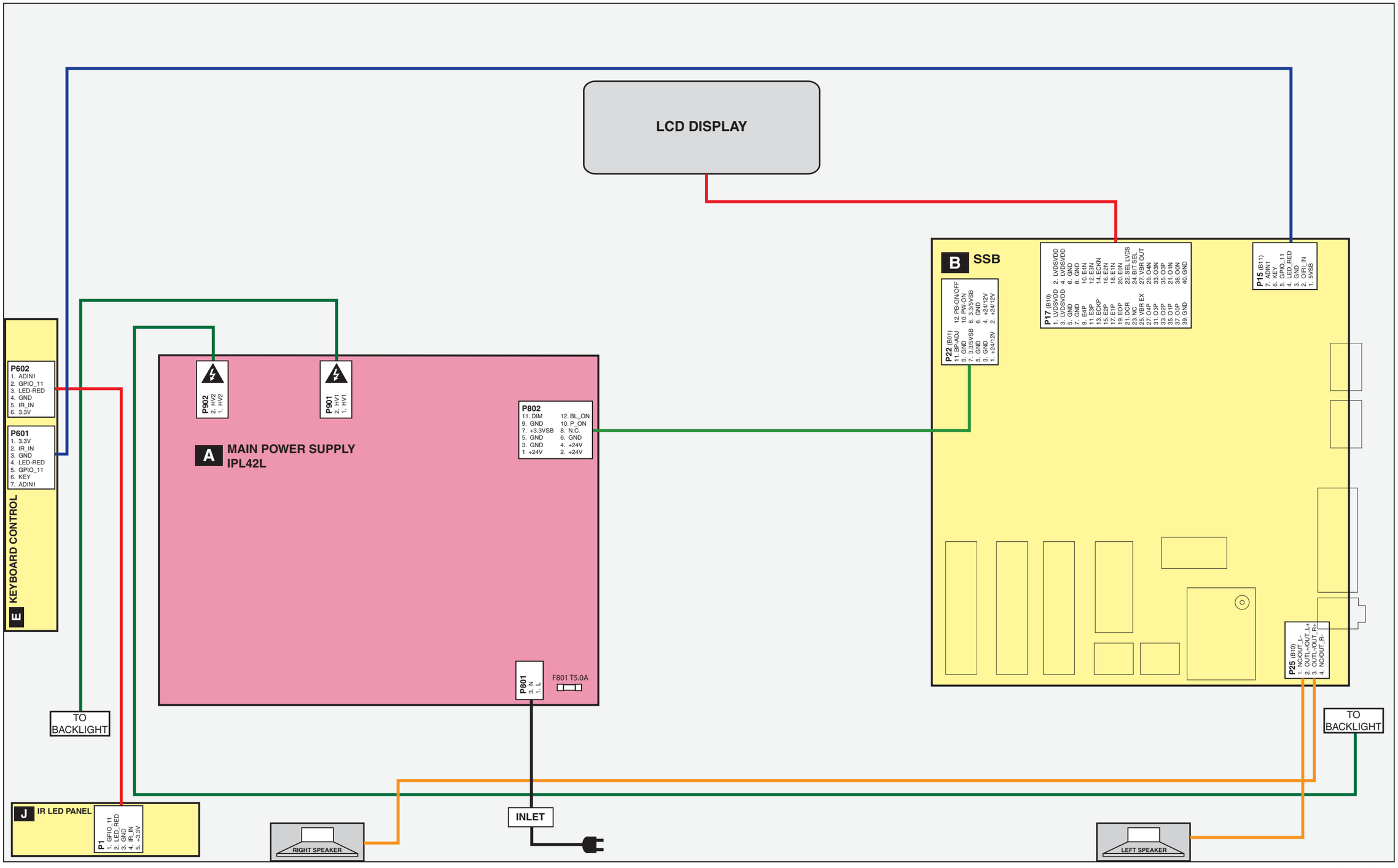
WIRING DIAGRAM 32" (CLICK)



18650_400_090603.eps
090603

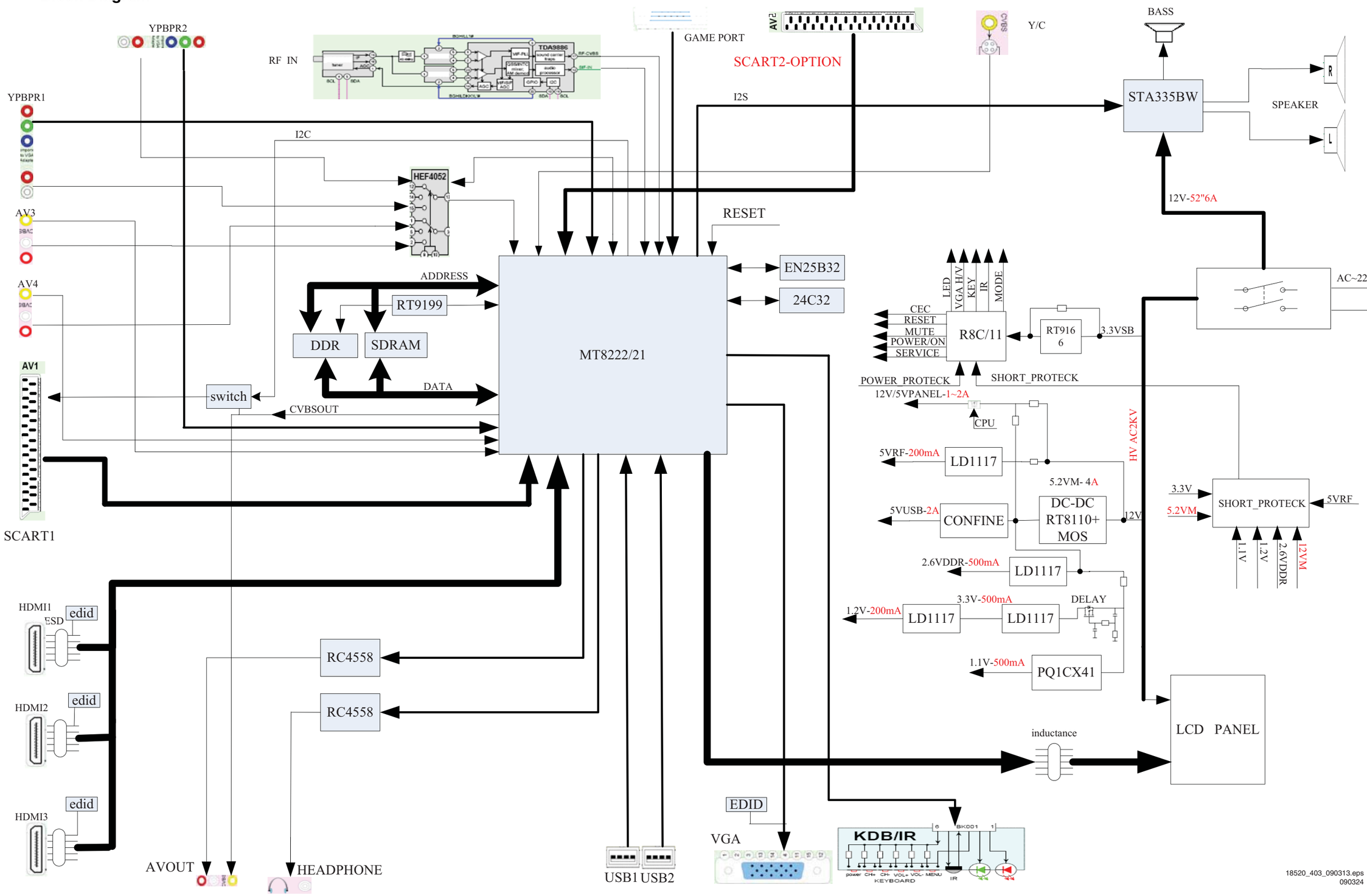
Wiring Diagram 42" (Click)

WIRING DIAGRAM 42" (CLICK)



18650_401_090603.eps
090603

Block Diagram

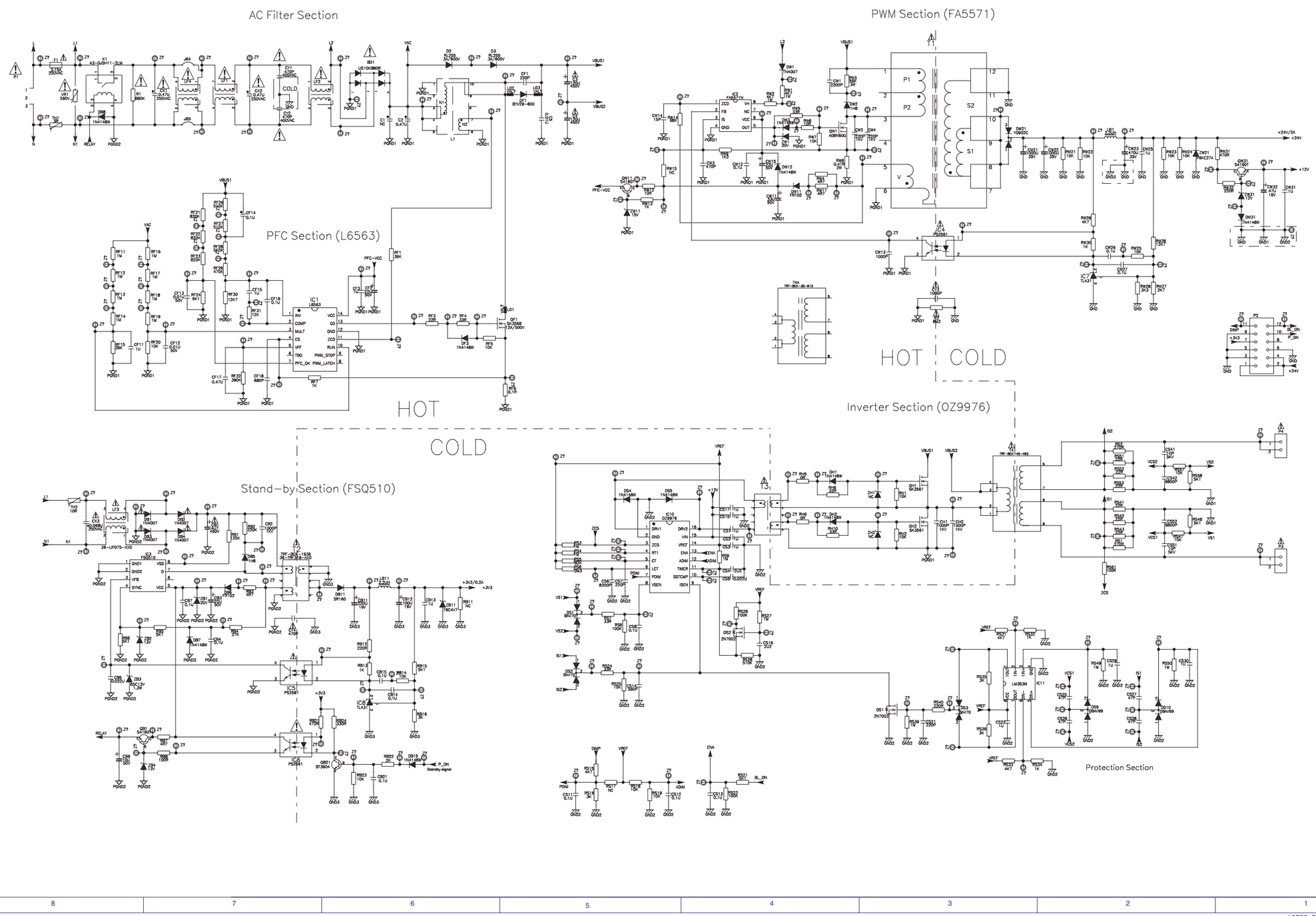


18520_403_090313.eps
090324

10. Circuit Diagrams and PWB Layouts

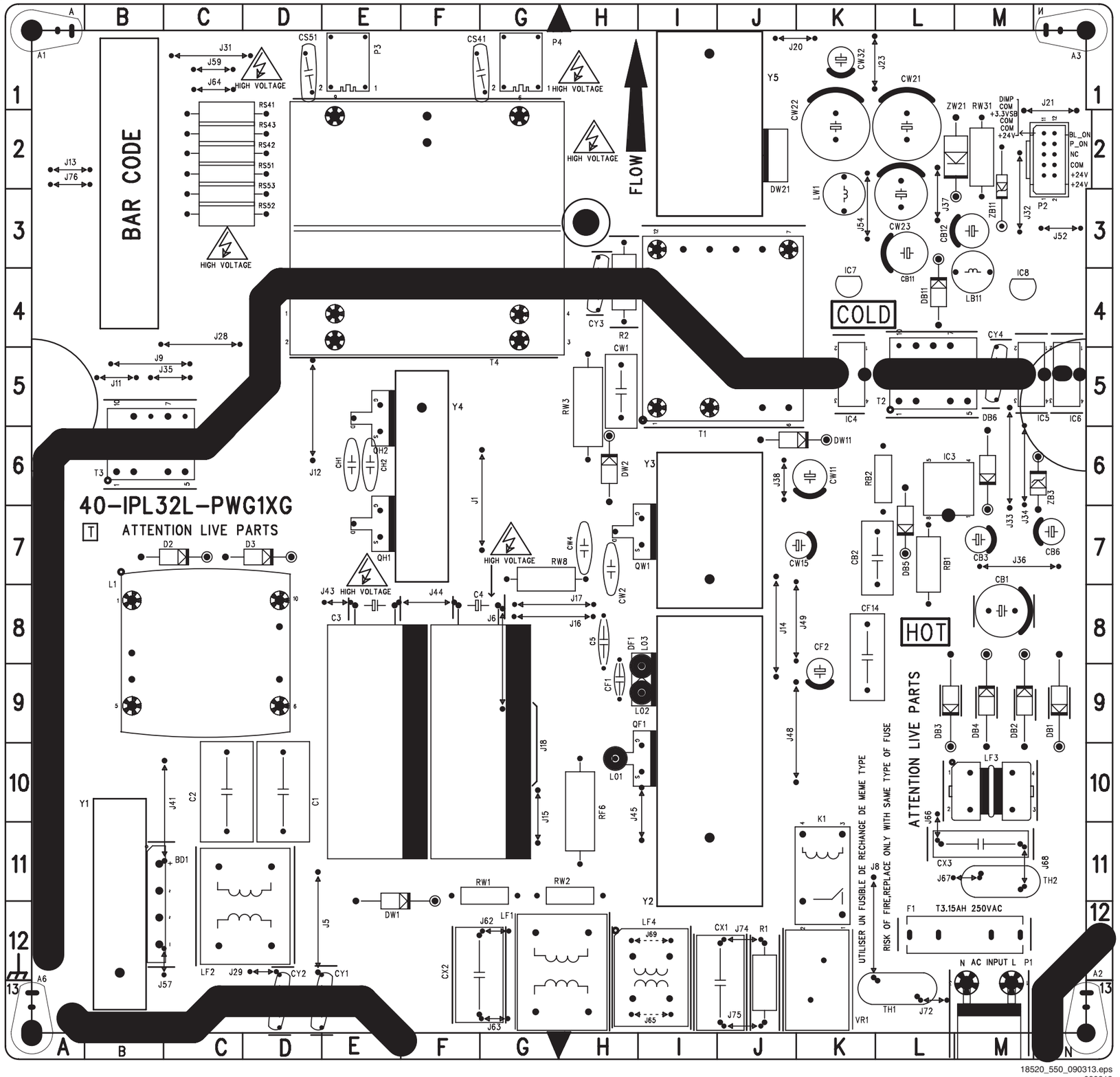
PSU: Power Supply Unit (32")

A1 Power Supply Unit (32" Full HD)



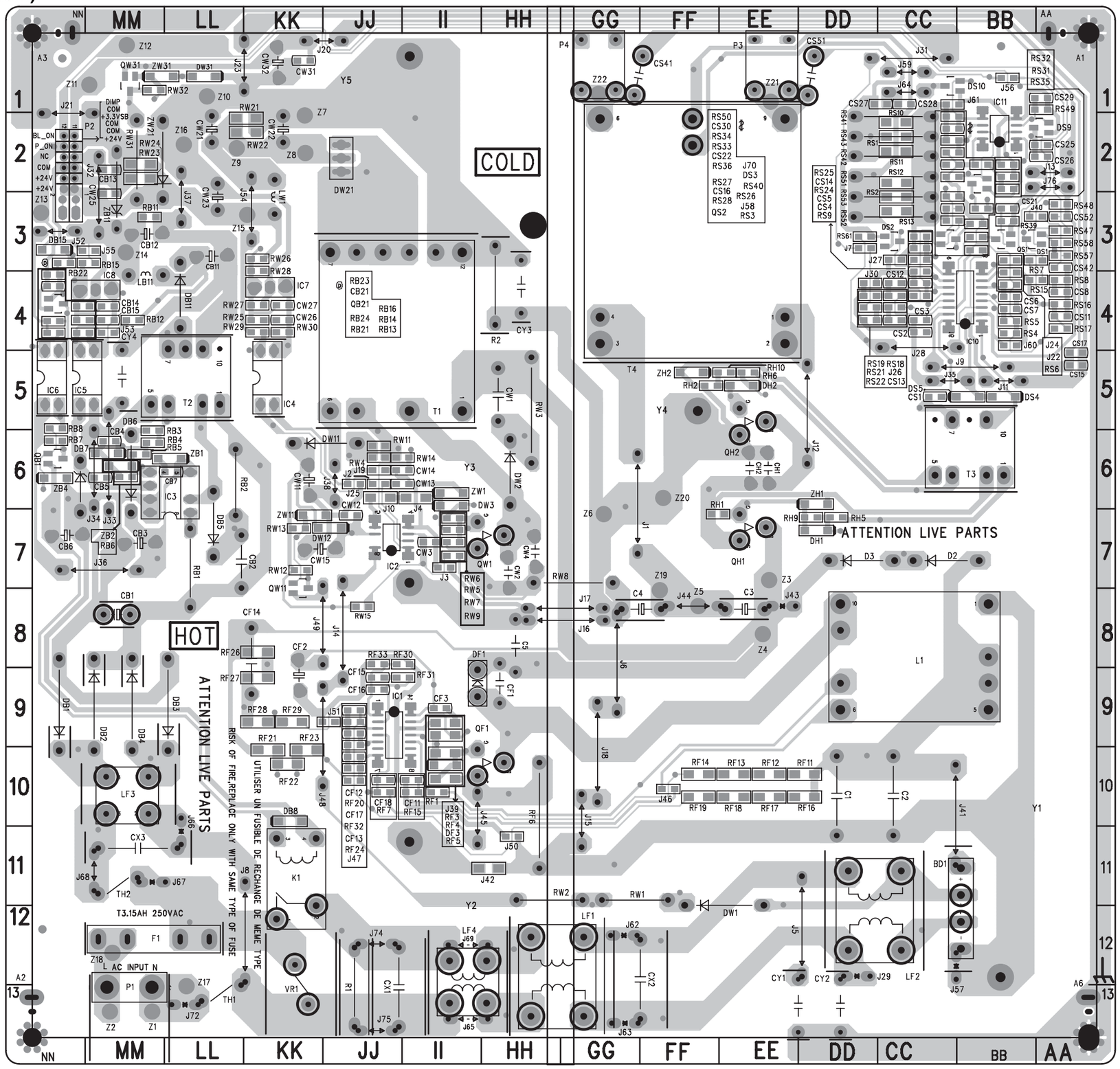
18520_541_090313.eps
090313

Layout 32" PSU (Top)



18520_550_090313.eps
090313

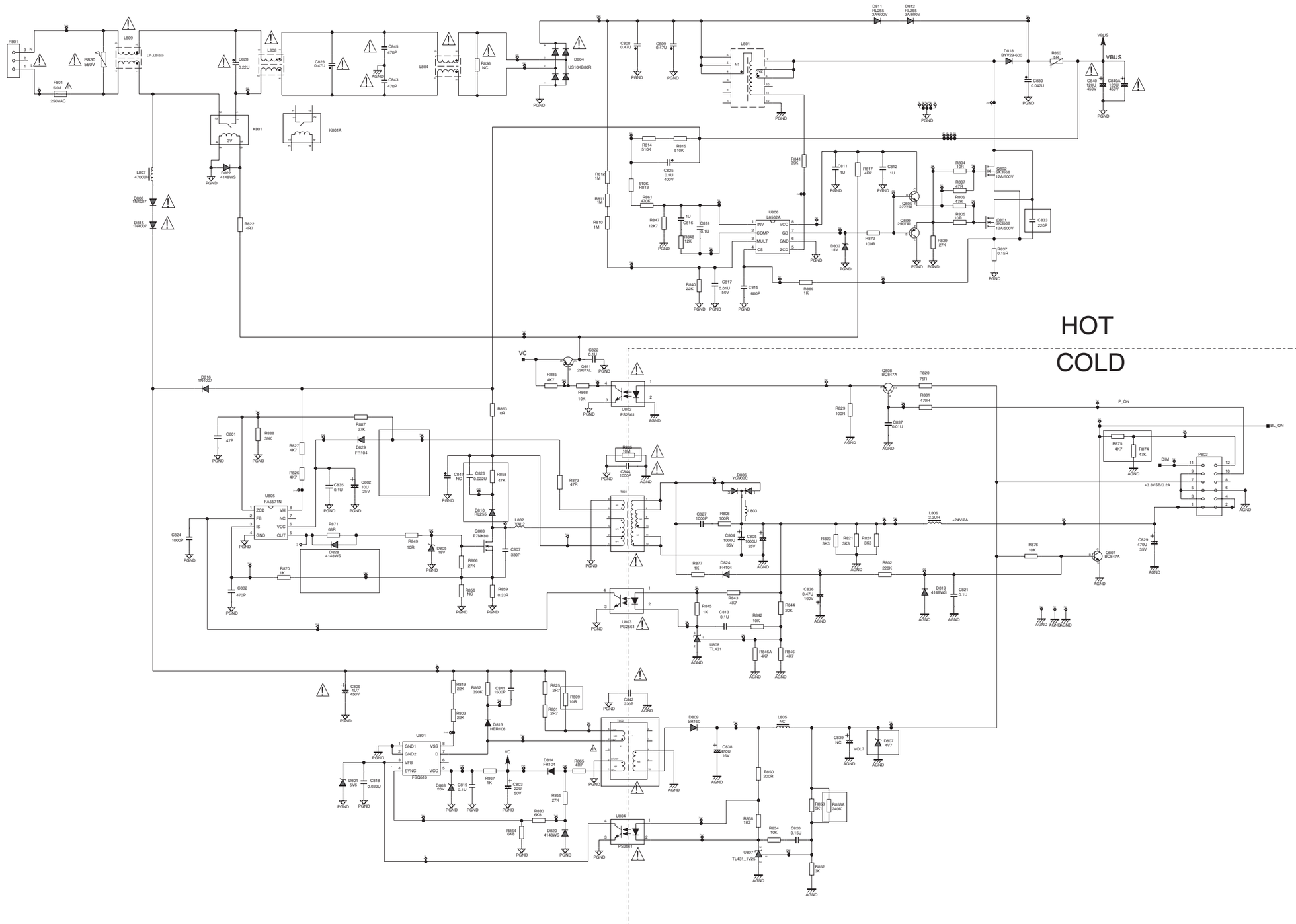
Layout 32" PSU (Bottom)


COLD
HOT
ATTENTION LIVE PARTS
ATTENTION LIVE PARTS
RISK OF FIRE,REPLACE ONLY WITH SAME TYPE OF FUSE
UTILISER UN FUSIBLE DE RECHANGE DE MEME TYPE
T3.15AH 250VAC
L AC INPUT N
MM LL KK JJ II HH GG FF EE DD CC BB AA
NN

18520_551_090313.eps
090313

PSU: Power Supply Unit (42")

A1 Power Supply Unit (42")



18520_542_090313.eps
090313

PSU: Power Supply Unit (42")

A2 Power Supply Unit (42")

HOT

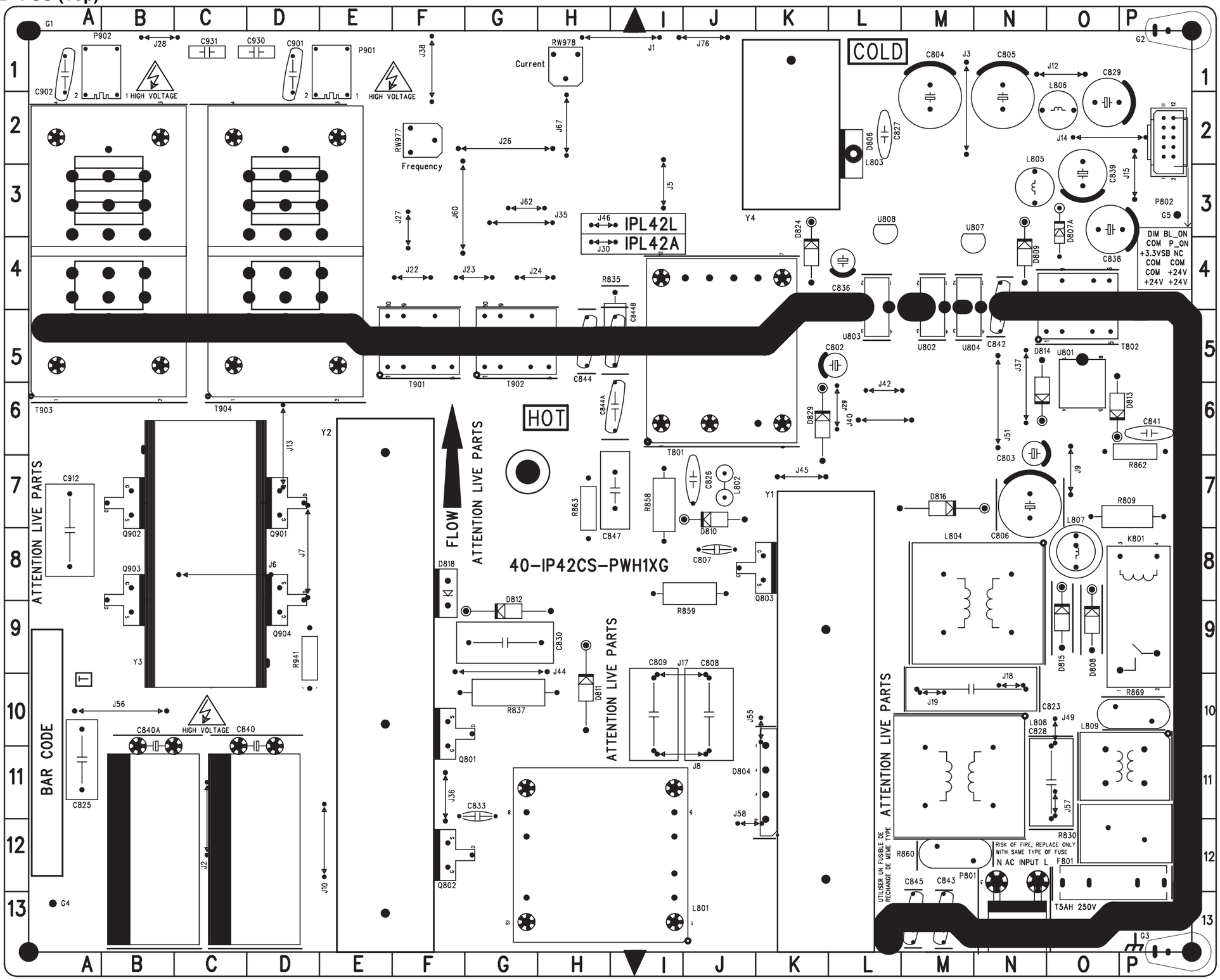
COLD

U901

OZ9926A

18520_543_090313.eps
090313

Layout 42" PSU (Top)



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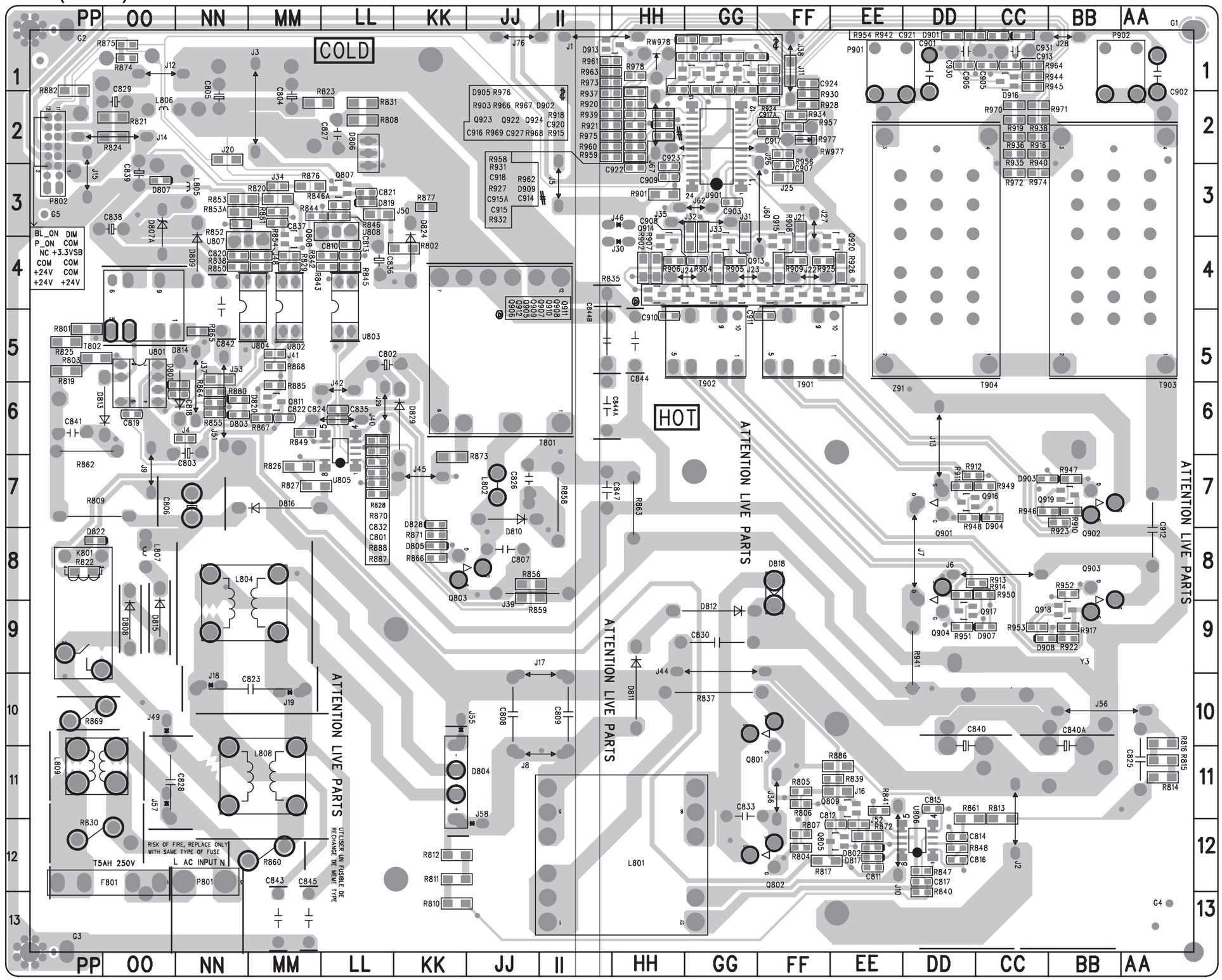
090313

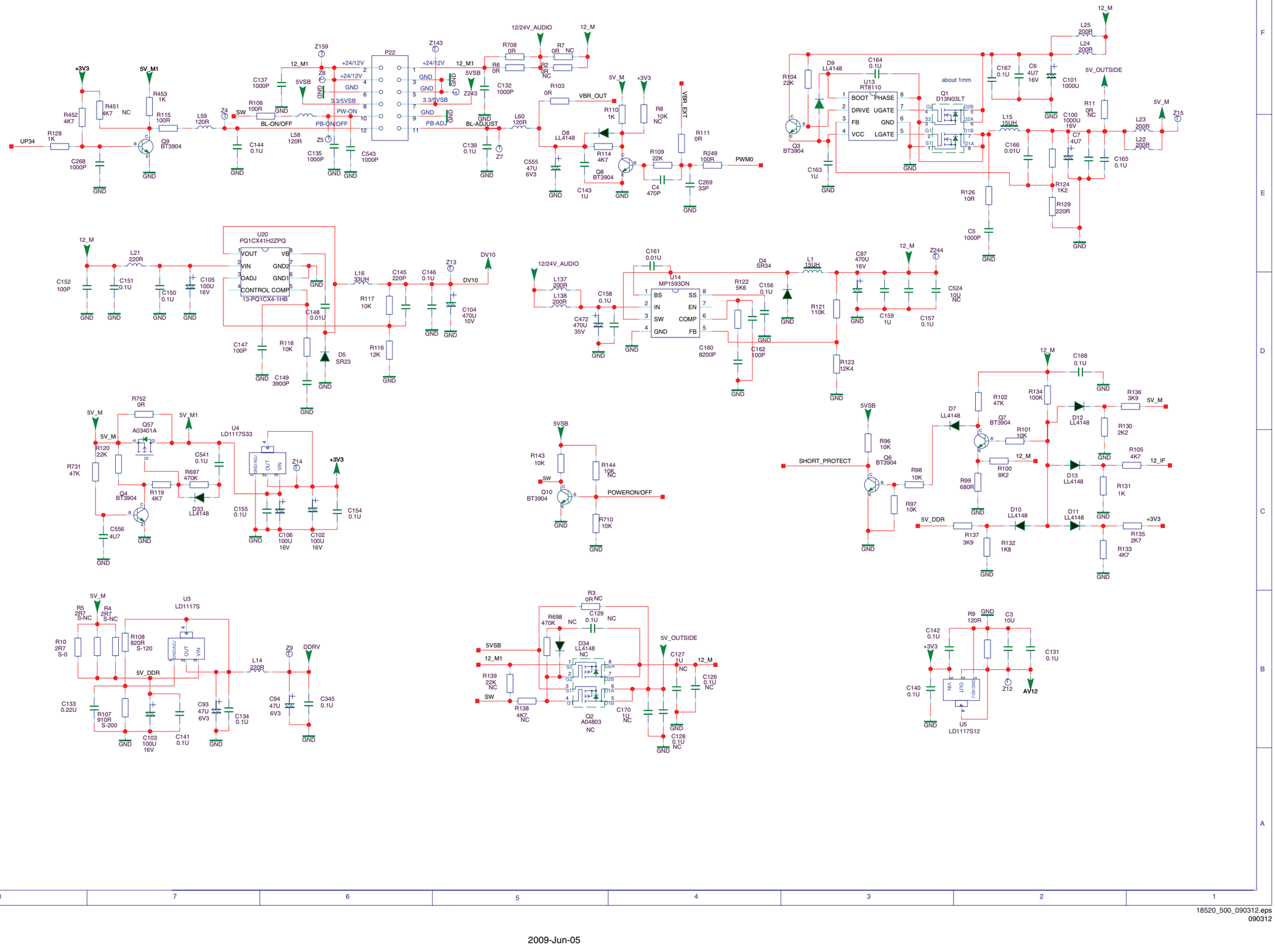
Layout 42" PSU (Bottom)


COLD
HOT
ATTENTION LIVE PARTS
ATTENTION LIVE PARTS
ATTENTION LIVE PARTS
ATTENTION LIVE PARTS
UTILISER UN FUSIBLE DE RECHANGE DE MEME TYPE
RISK OF FIRE, REPLACE ONLY WITH SAME TYPE OF FUSE
T5AH 250V
L AC INPUT N
BL_ON DIM
P_ON COM
NC +3.3VSB
COM COM
+24V COM
+24V +24V
PP OO NN MM LL KK JJ II HH GG FF EE DD CC BB AA
1 2 3 4 5 6 7 8 9 10 11 12 13

15820_553_090313.eps
090313

SSB: DC/DC

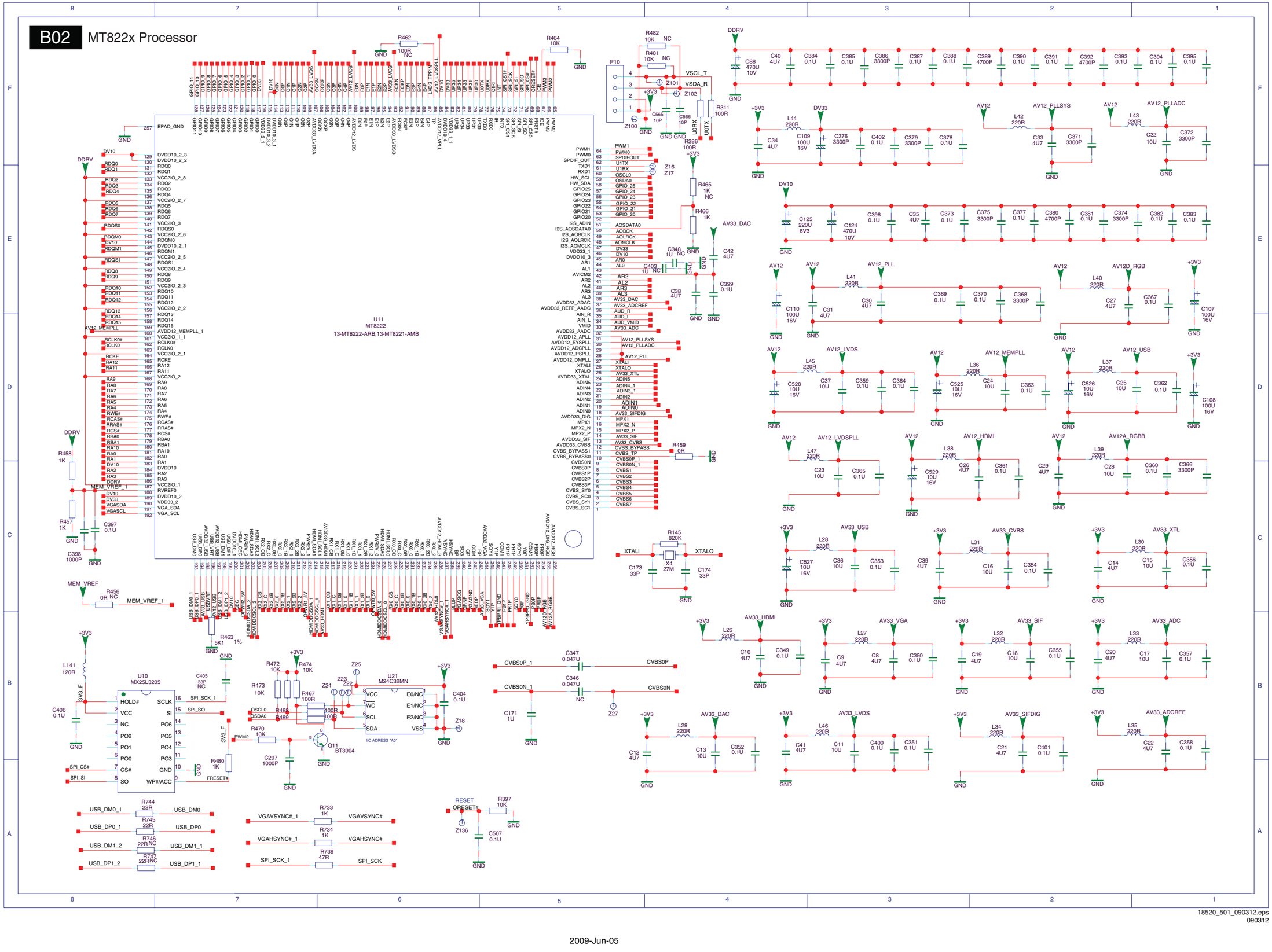
B01 DC - DC



18520_500_090312.eps
090312

SSB: MT822x Processor

B02 MT822x Processor

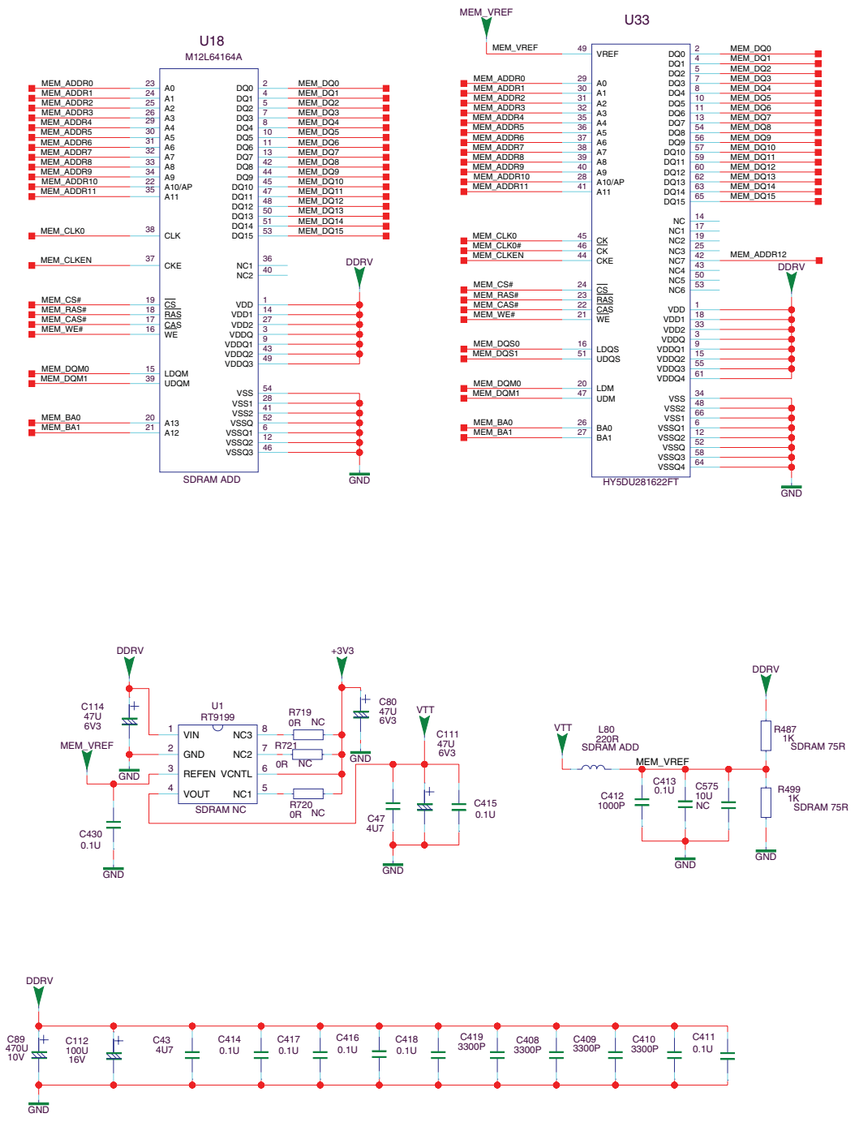


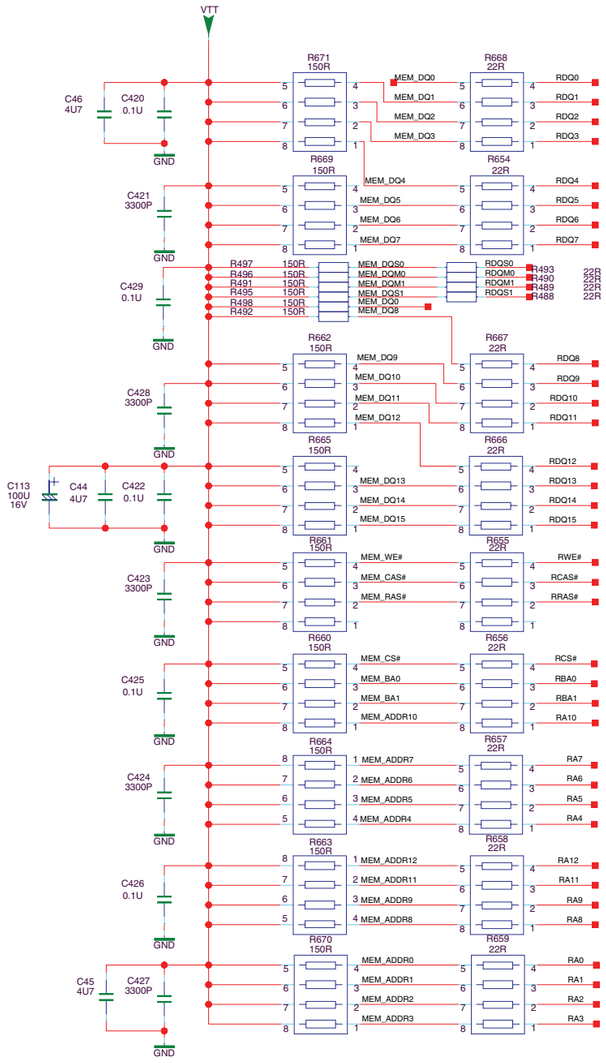
18520_501_090312.eps
090312

SSB: DDR SD-RAM

B03 DDR SD-RAM

(DDR SD-RAM with termination)





18520_502_090312.eps
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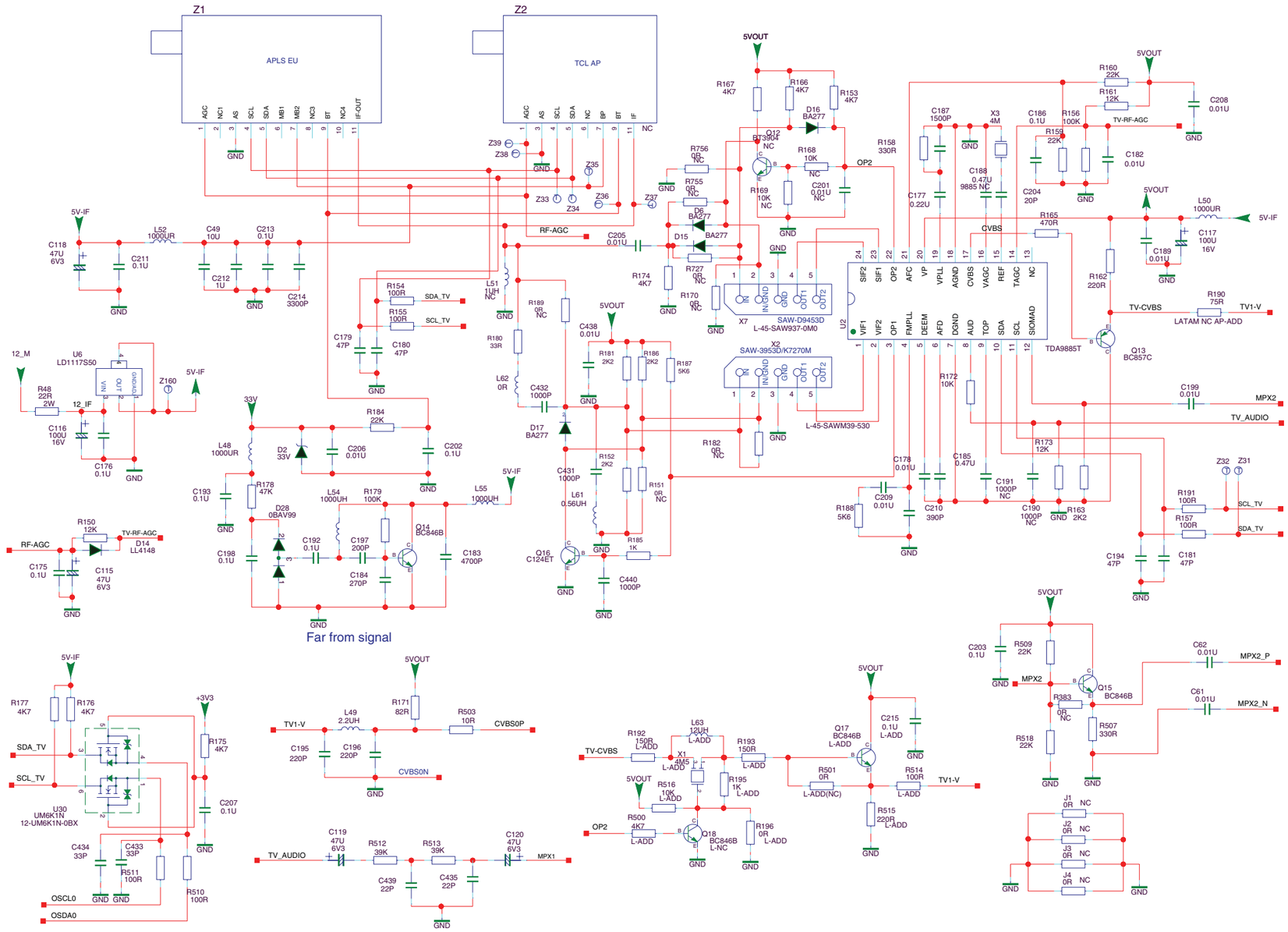
SSB: Tuner

B04 TUNER



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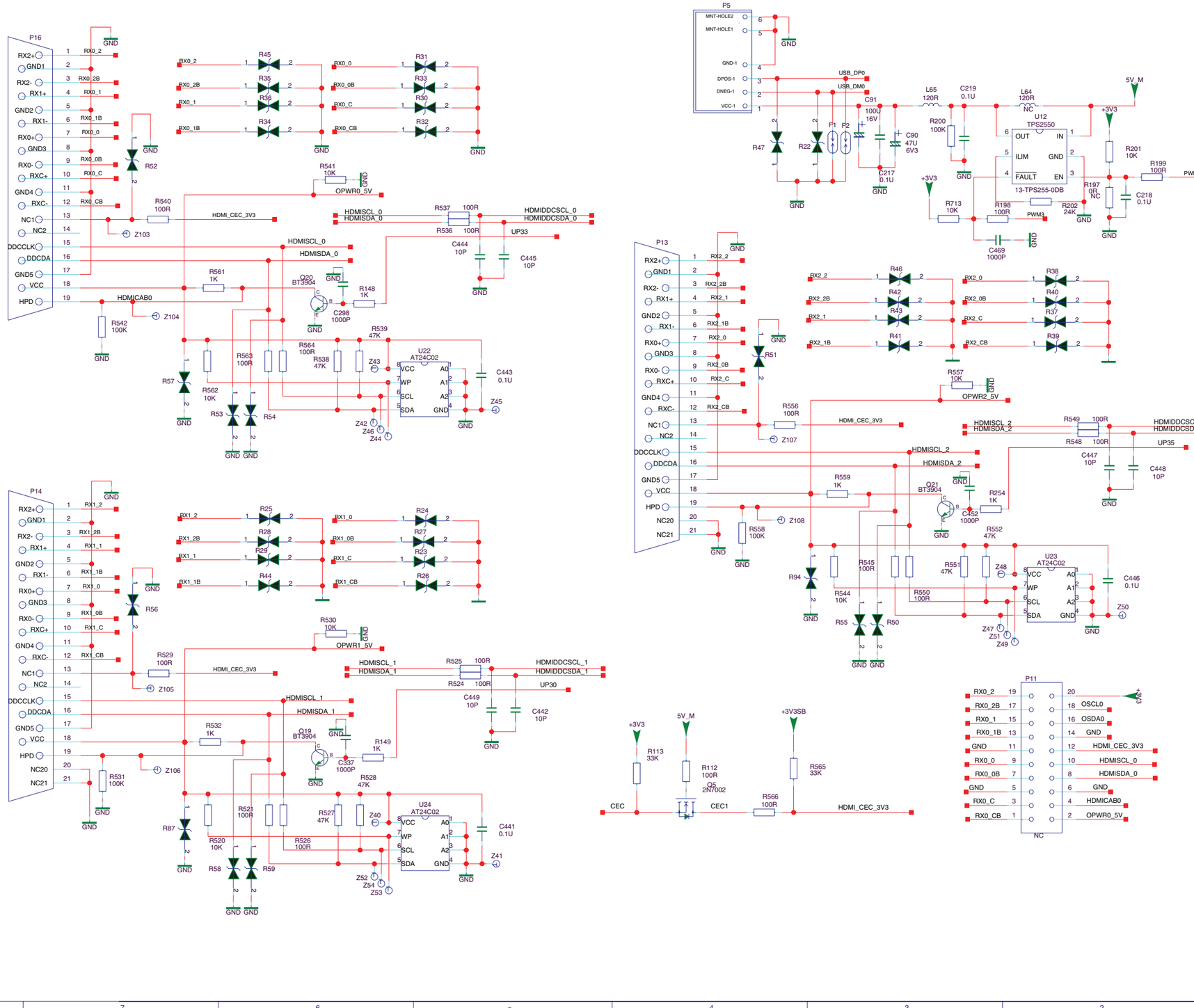
090312

SSB: HDMI

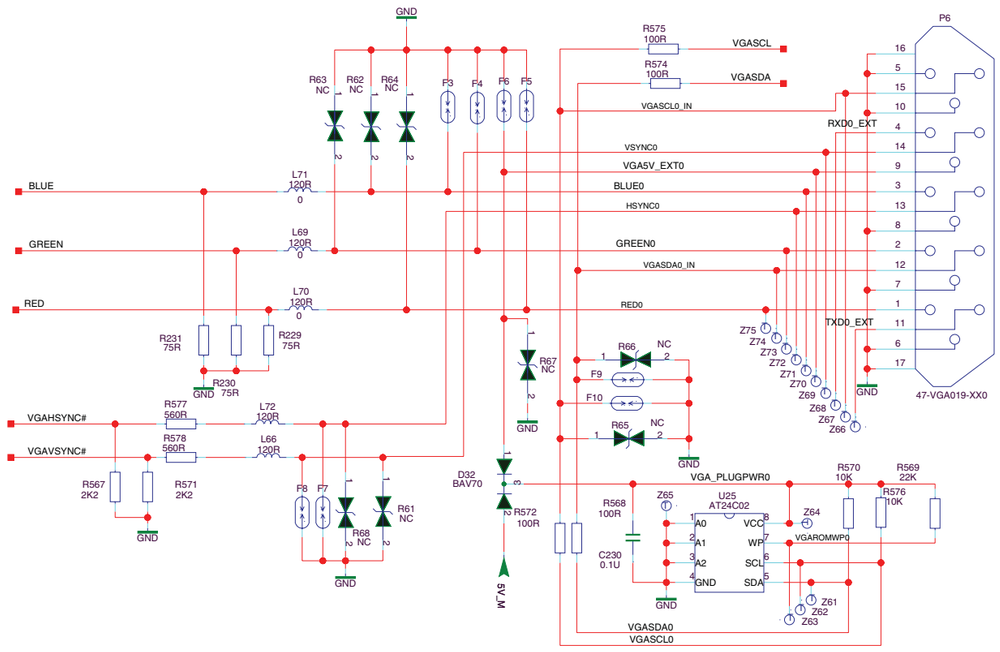
B05 HDMI



18520_504_090312.eps
090312

SSB: I/O - VGA, USB, S-Video

B06 I/O - VGA, USB, S-video



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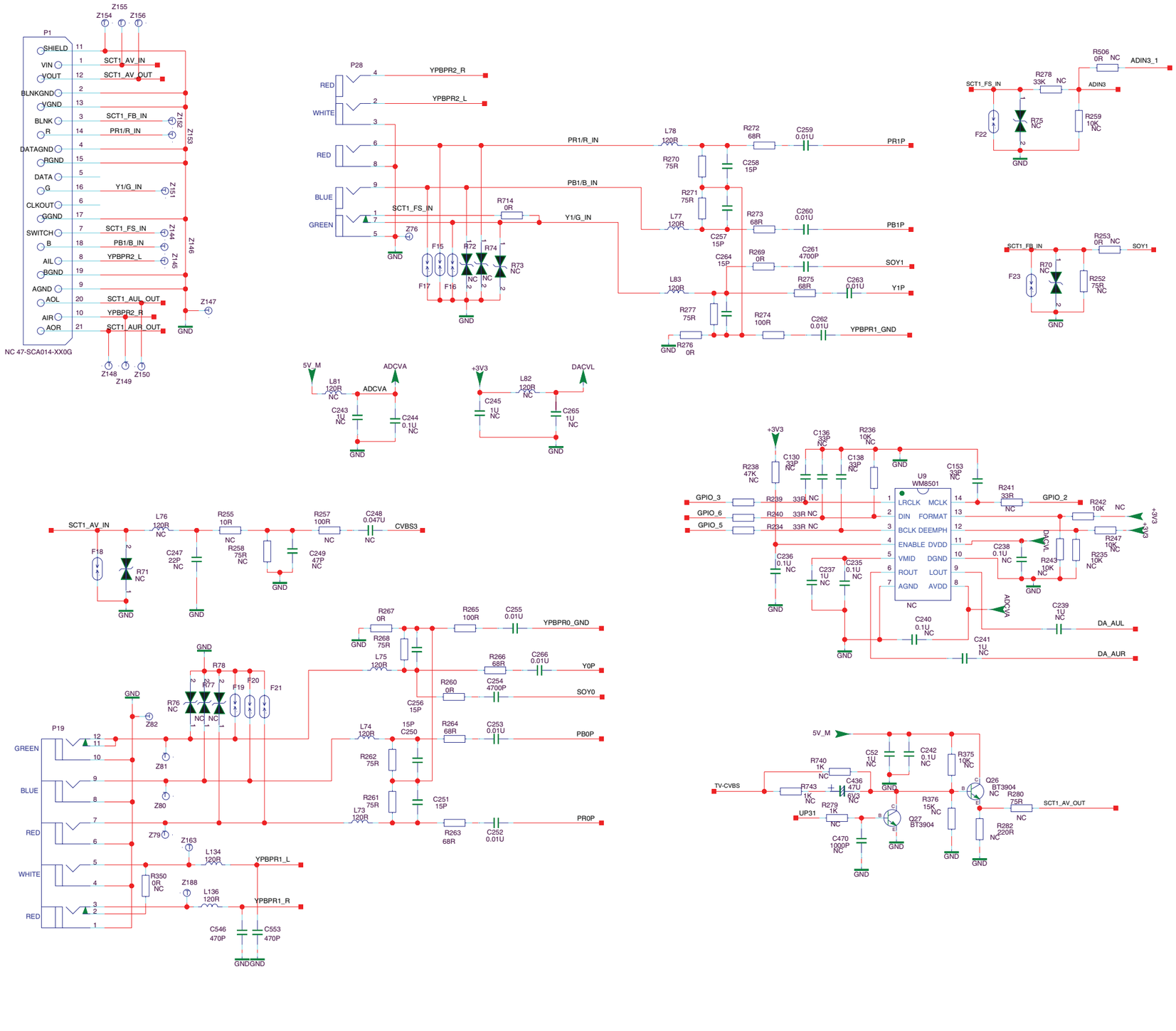
090312

SSB: Digital Analog Converter, DAC

B07 Digital Analog Converter, DAC



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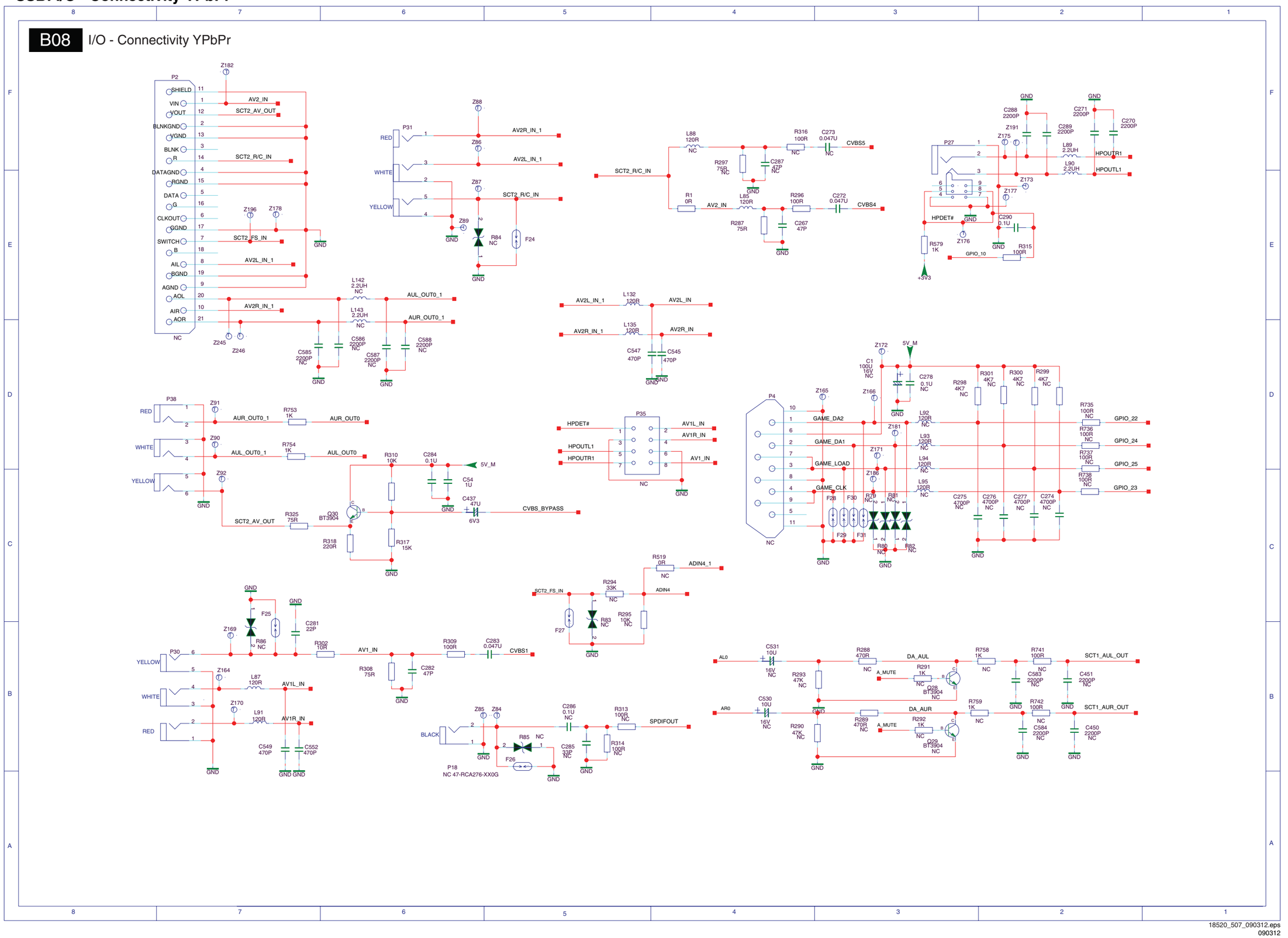
SSB: I/O - Connectivity YPbPr

B08 I/O - Connectivity YPbPr



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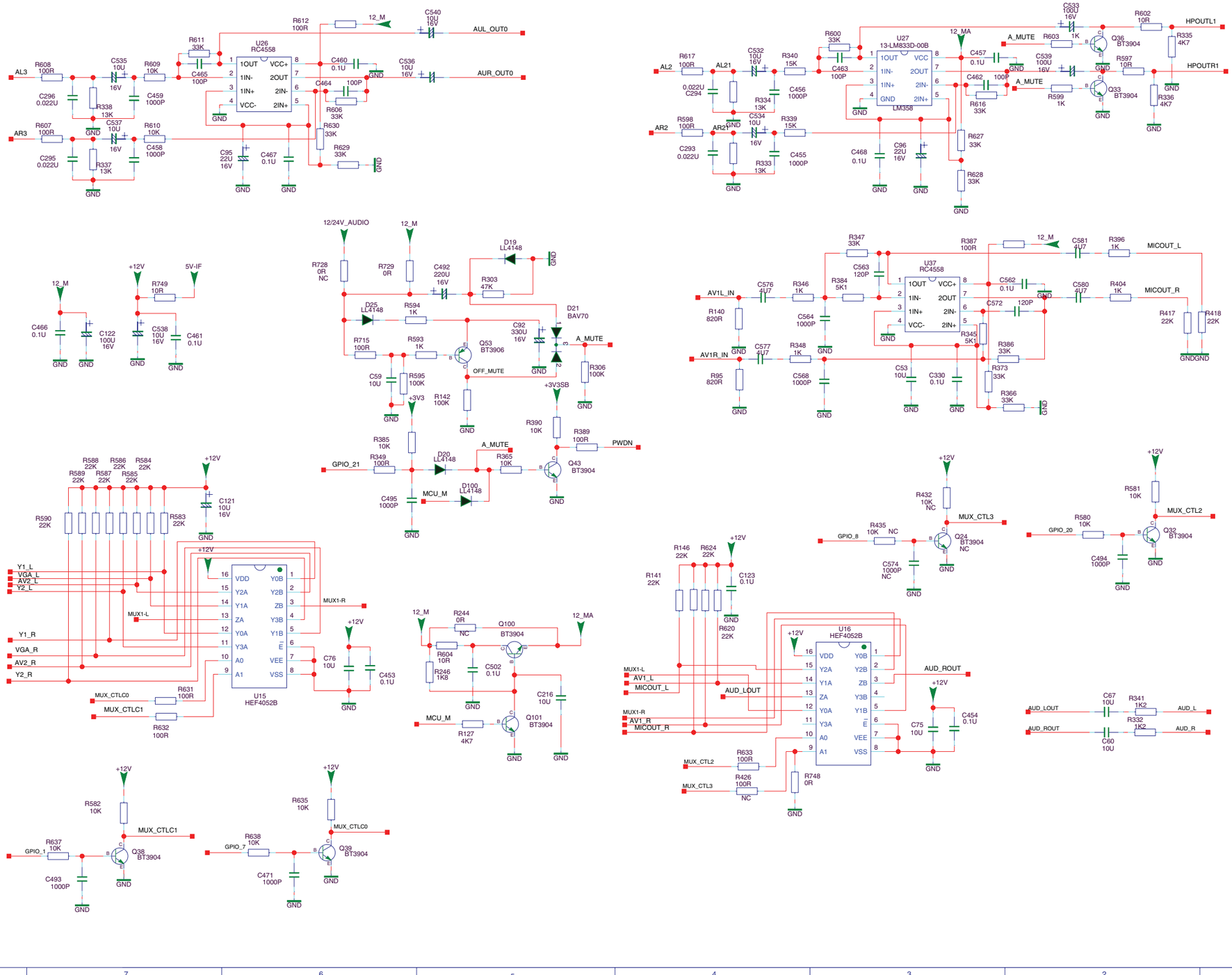
090312

SSB: MUX and DEMUX

B09 MUX and DEMUX



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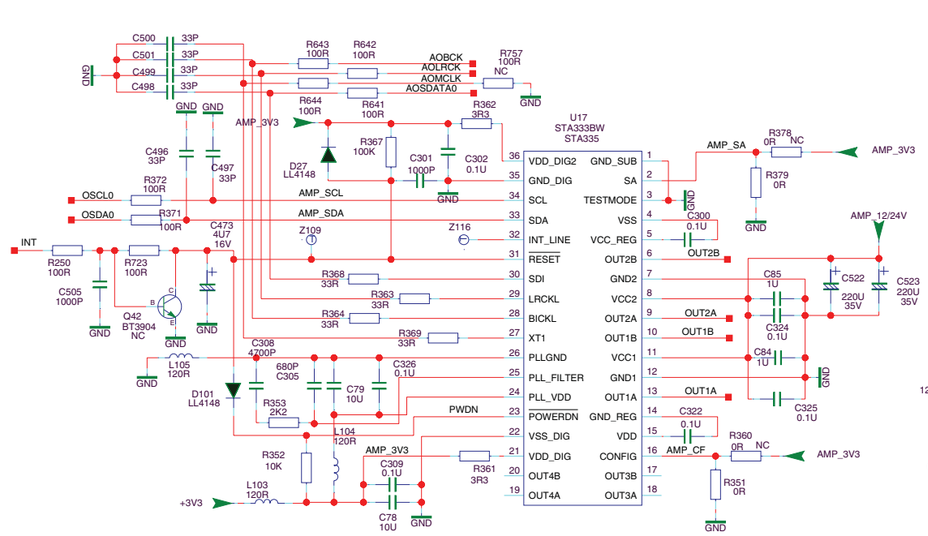
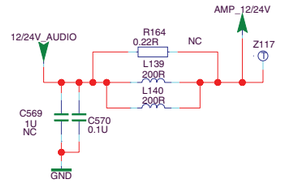
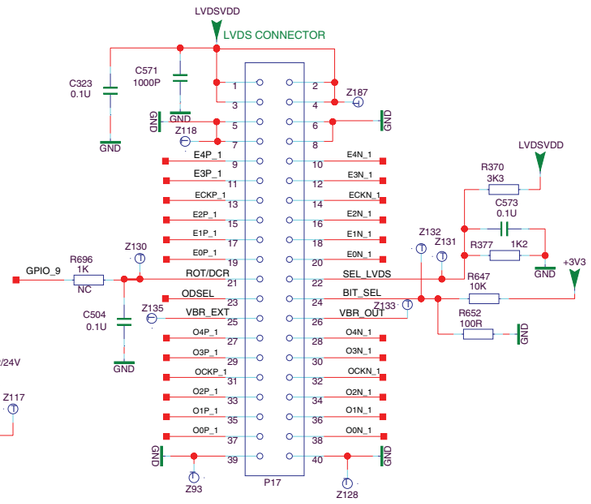
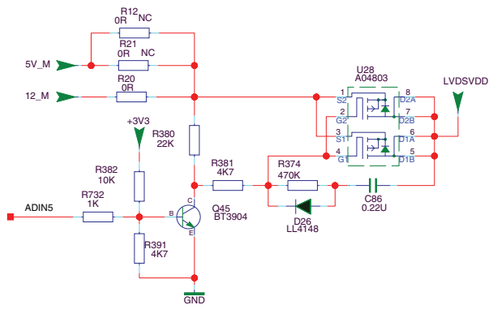
SSB: Audio Amplifier

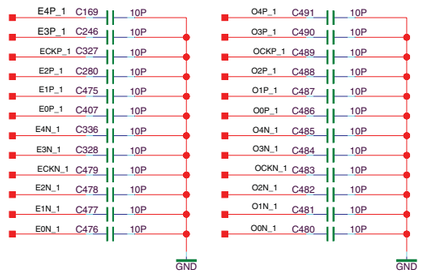
B10 Audio Amplifier

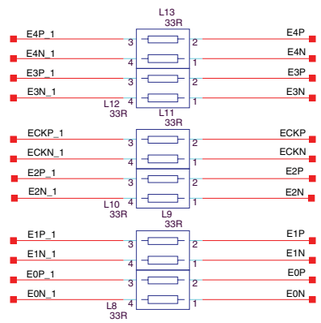


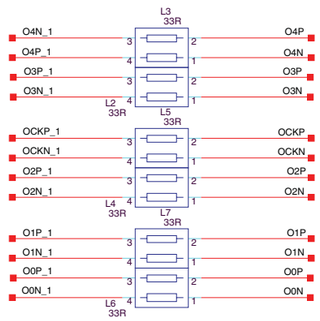


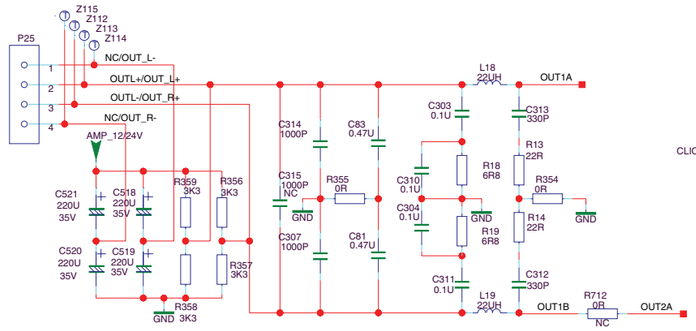


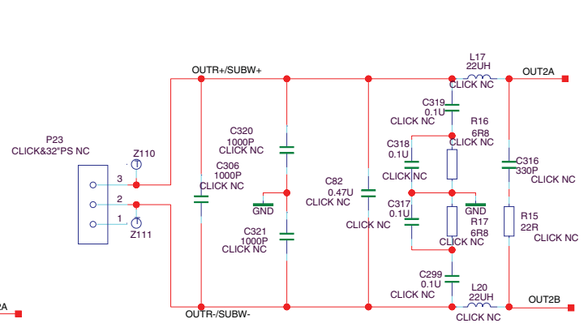


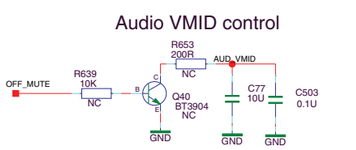












FOR 2.1 CONFIG:

R13 --- 22R ,R354 --- 0R , C312 --- 330P;
C81 --- 0.47U ,R355 --- 0R;
C518/C519/C520/C521 --- 330U/16;
R356/R357/R358/R359 --- 3K3;
C317/C318/C319/C299/R16/R17 --- NC

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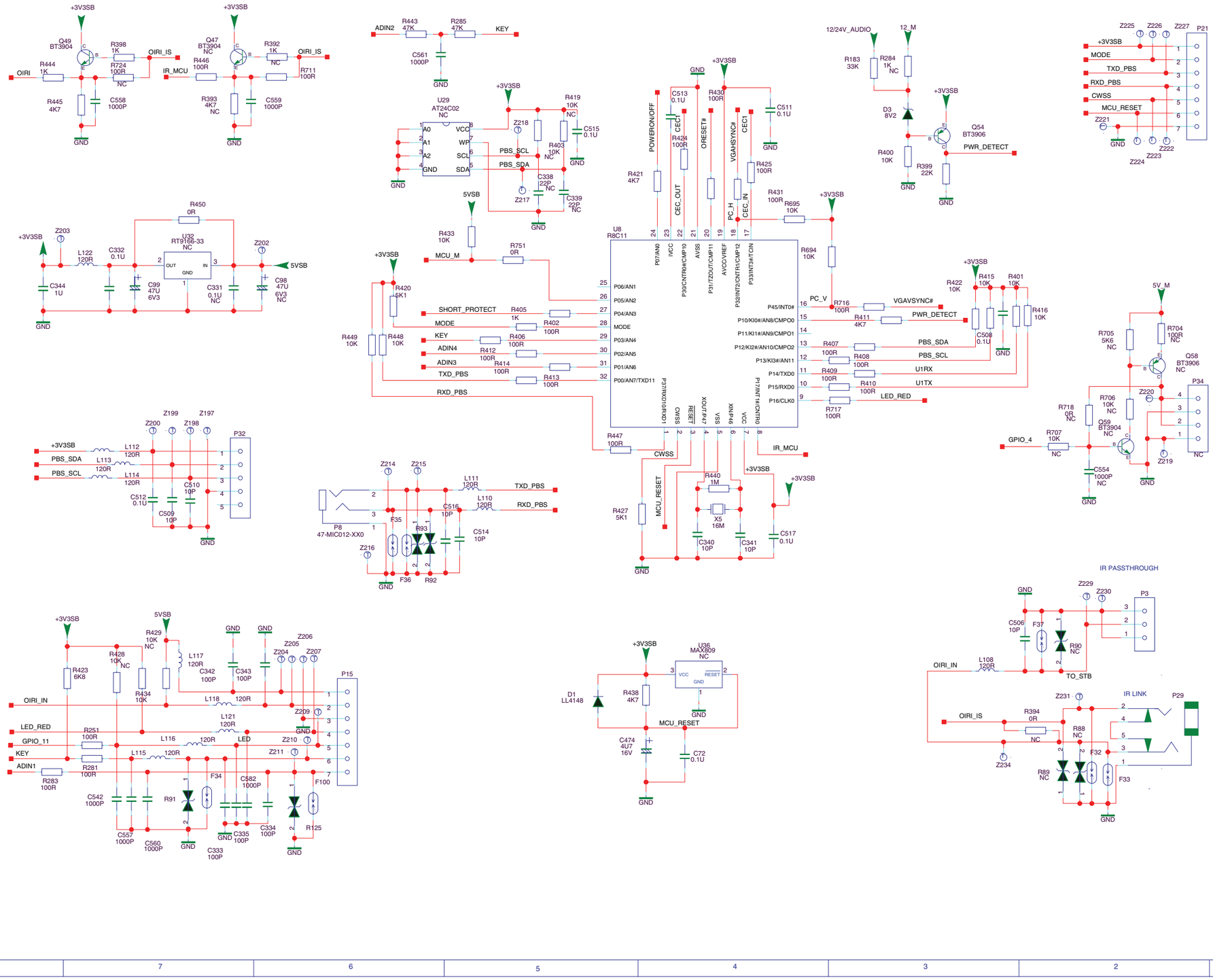
SSB: MCU Stand-by

B11 MCU Stand-by



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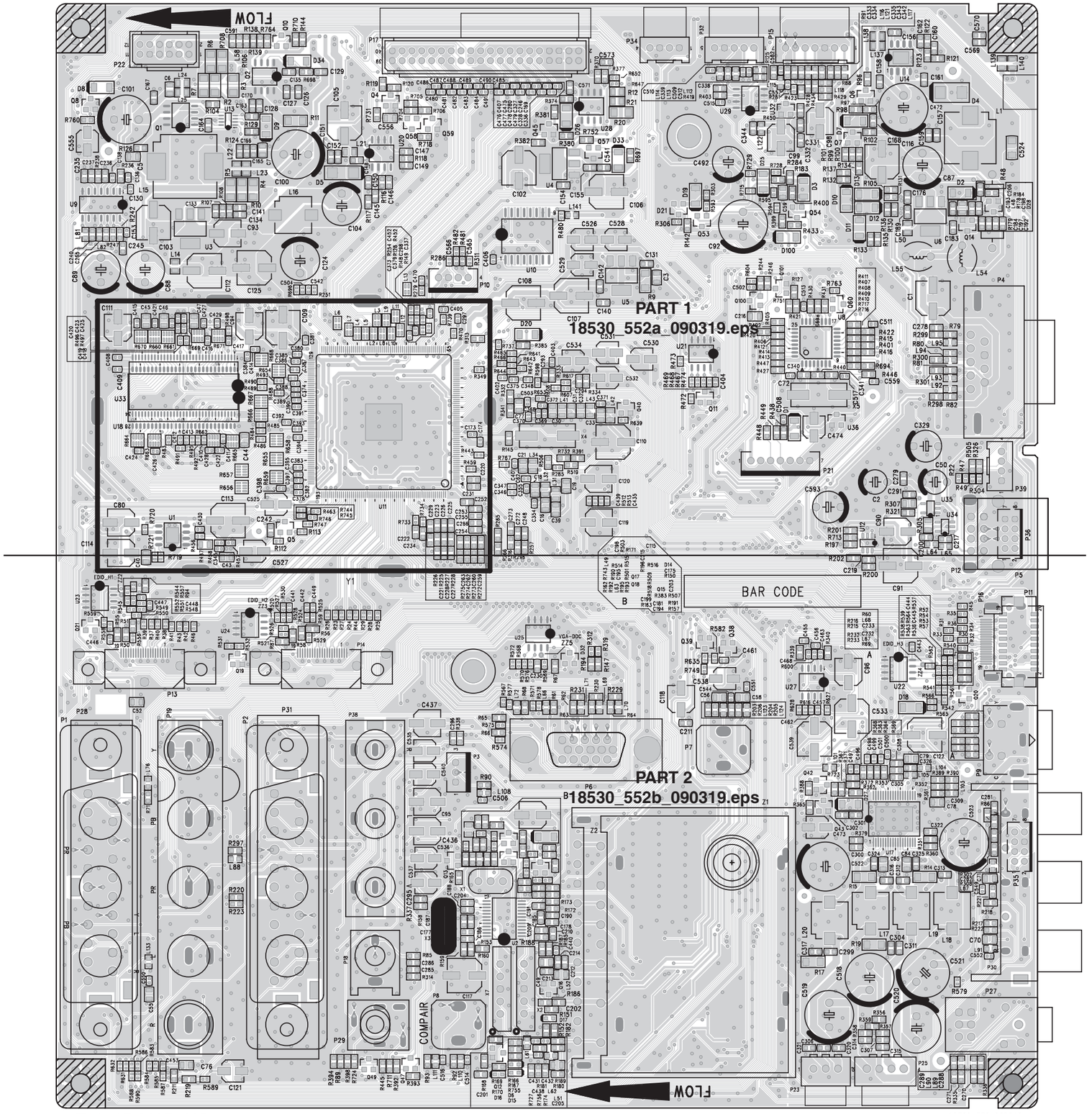
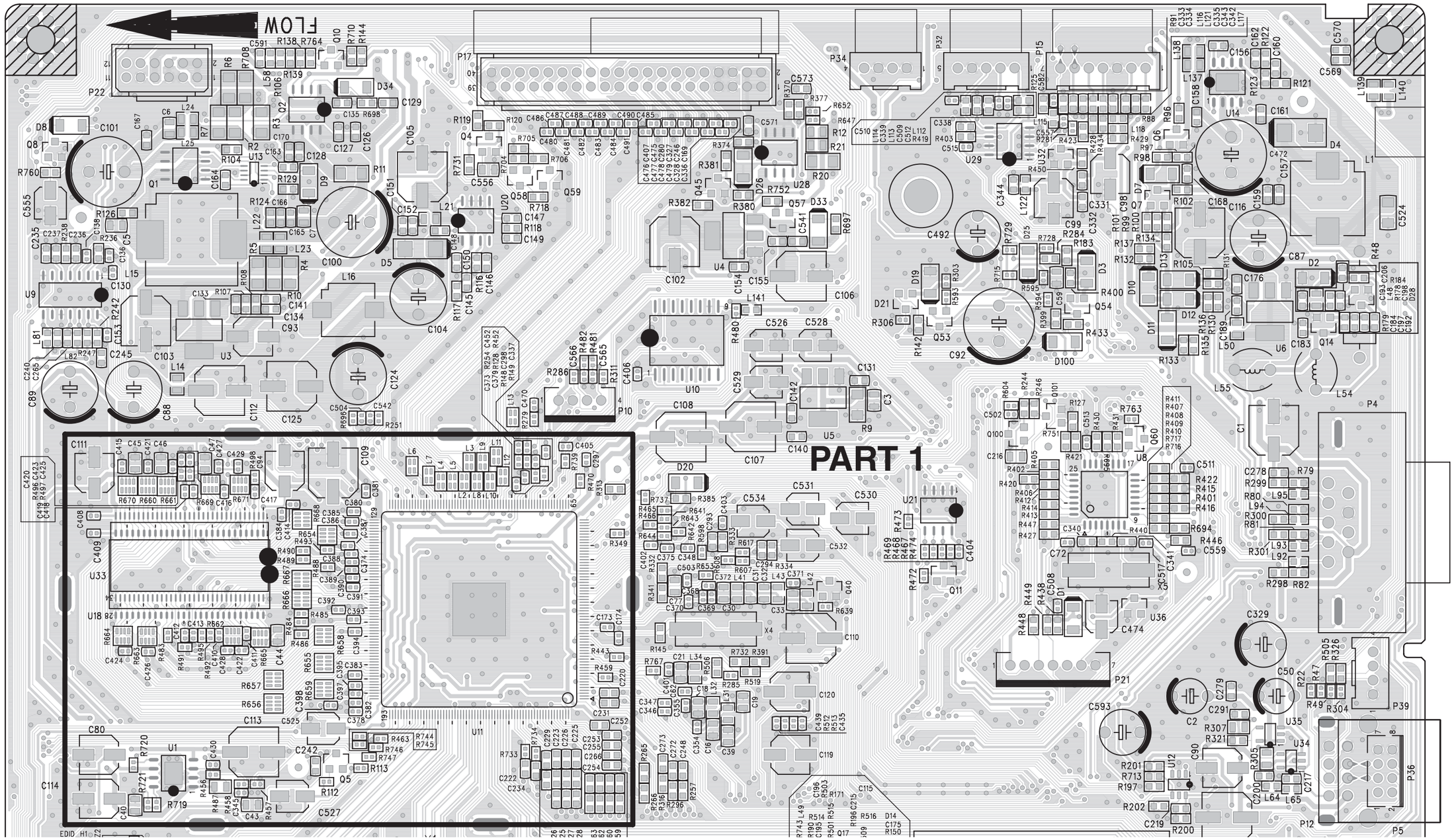
Layout Small Signal Board (Top)



40-T8222P-MAD2XG

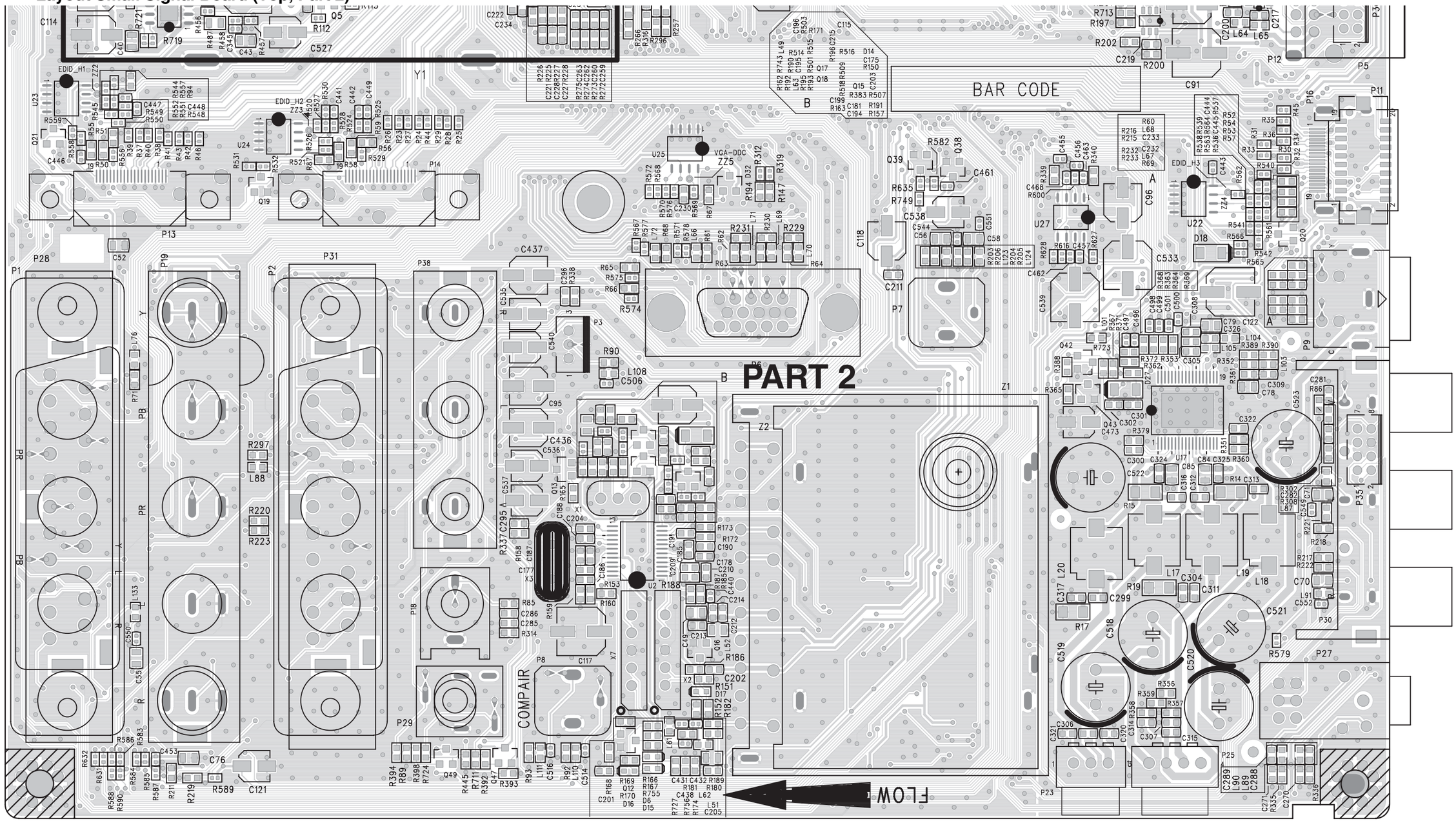
18520_556_090319.eps
090324

Layout Small Signal Board (Top, Part1)



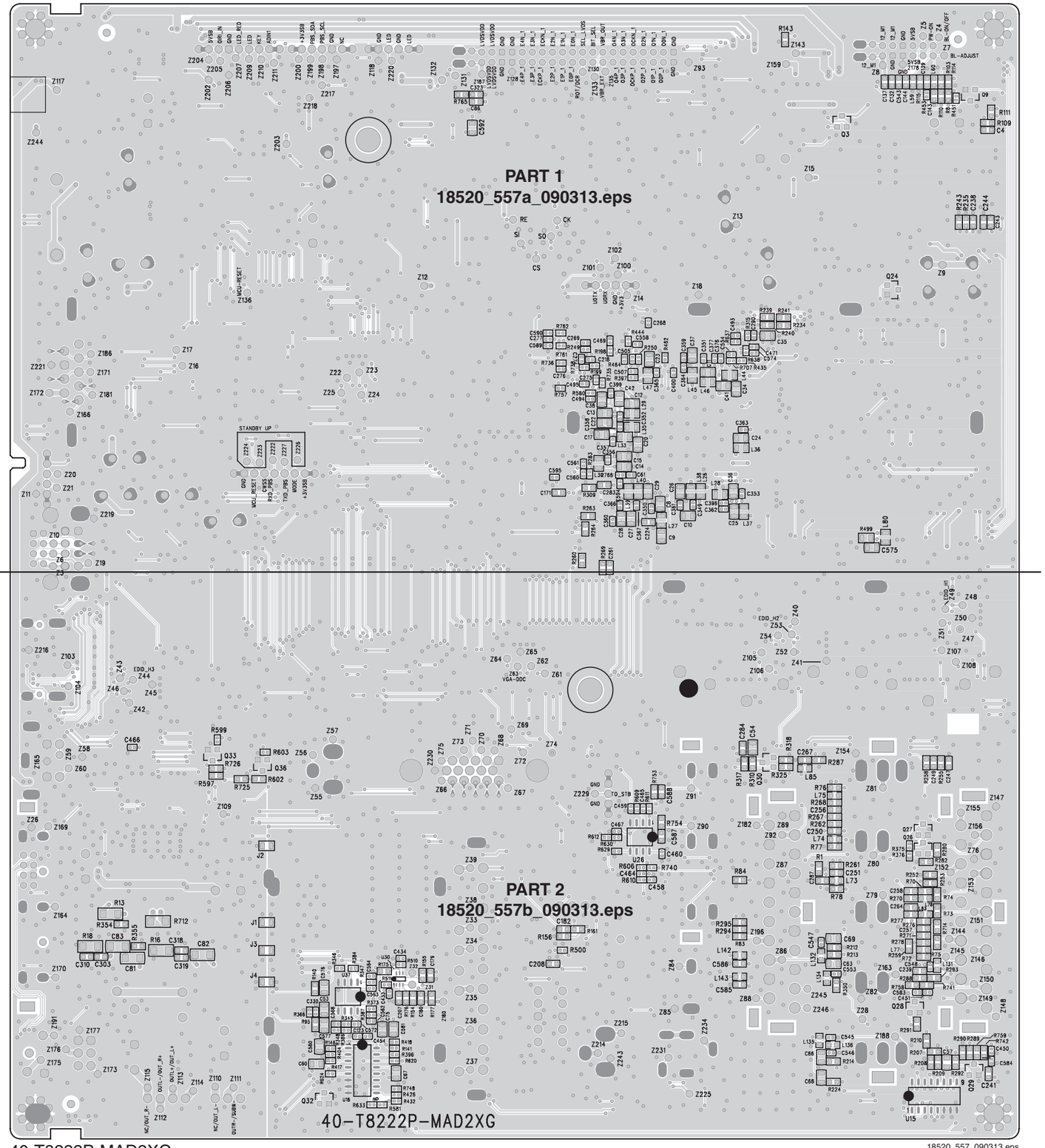
18520_556a_090313.eps
090324

Layout Small Signal Board (Top, Part 2)



18520_556b_090313.eps
090324

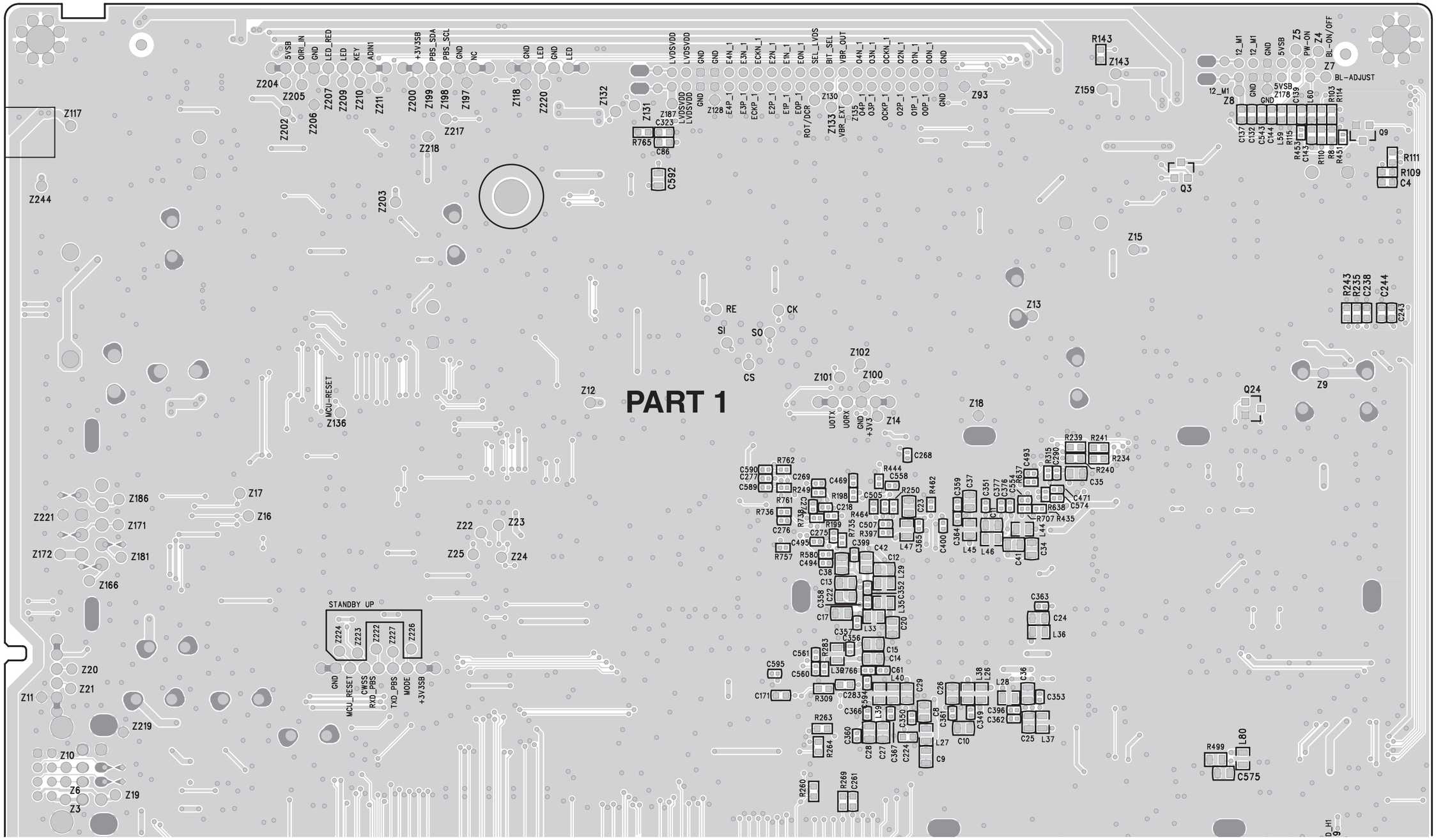
Layout Small Signal Board (Bottom)



40-T8222P-MAD2XG

18520_557_090313.eps
090324

Layout Small Signal Board (Bottom, Part1)



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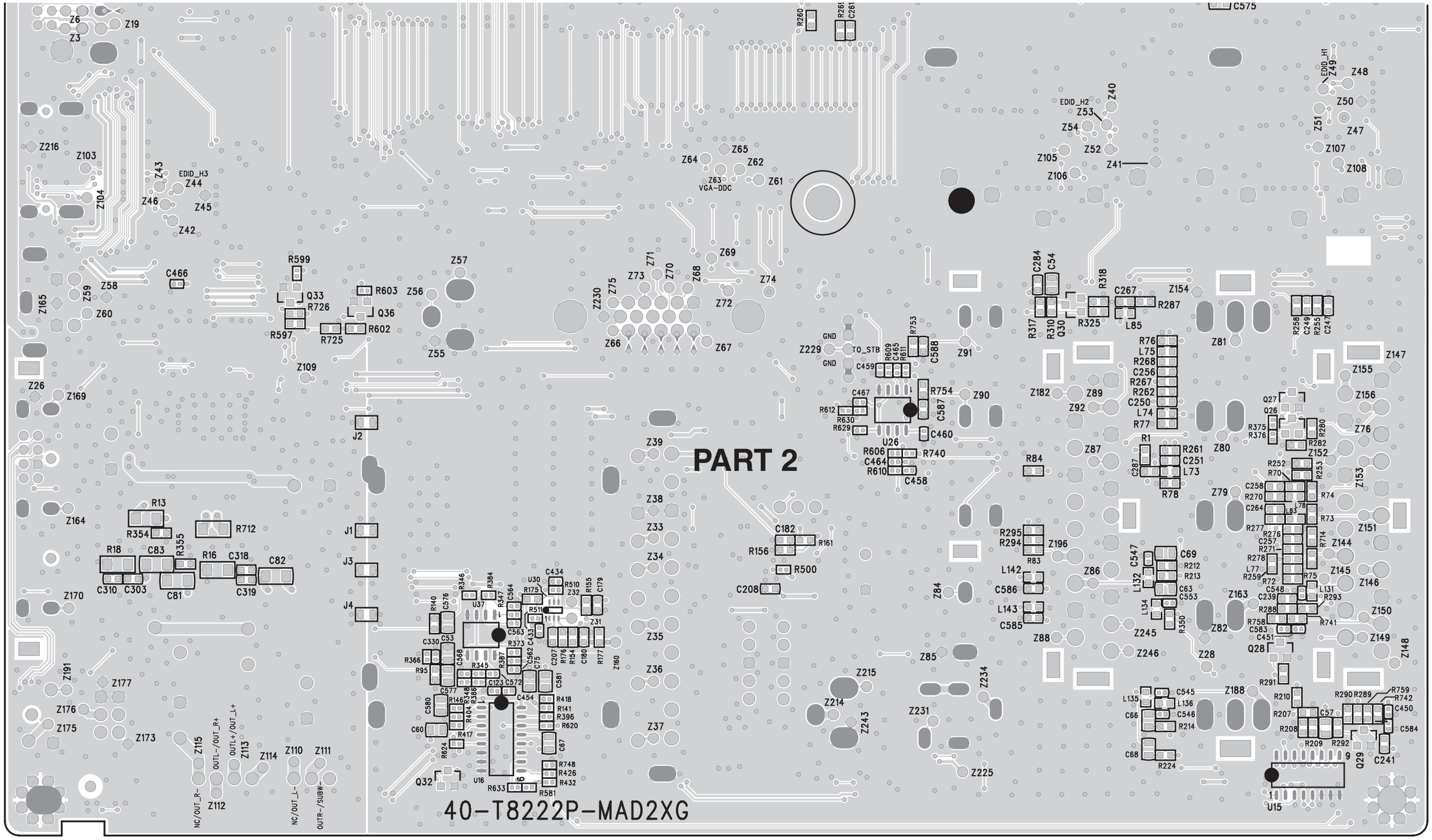
090324

Layout Small Signal Board (Bottom, Part 2)



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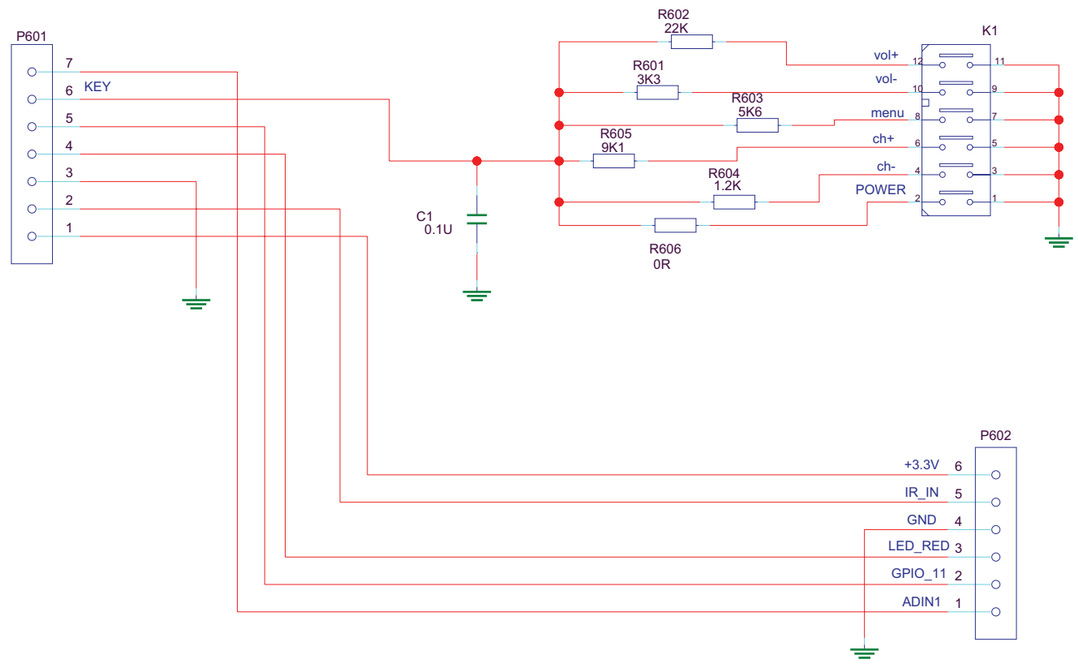
Side Control Panel

E Side Control Panel



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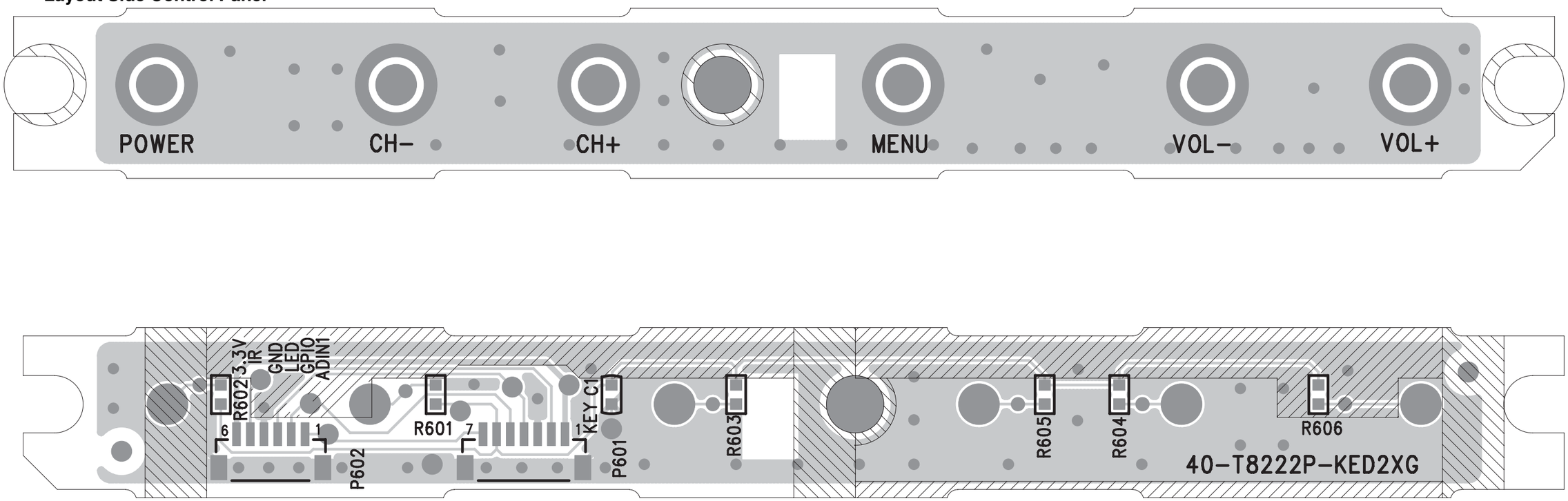
Layout Side Control Panel



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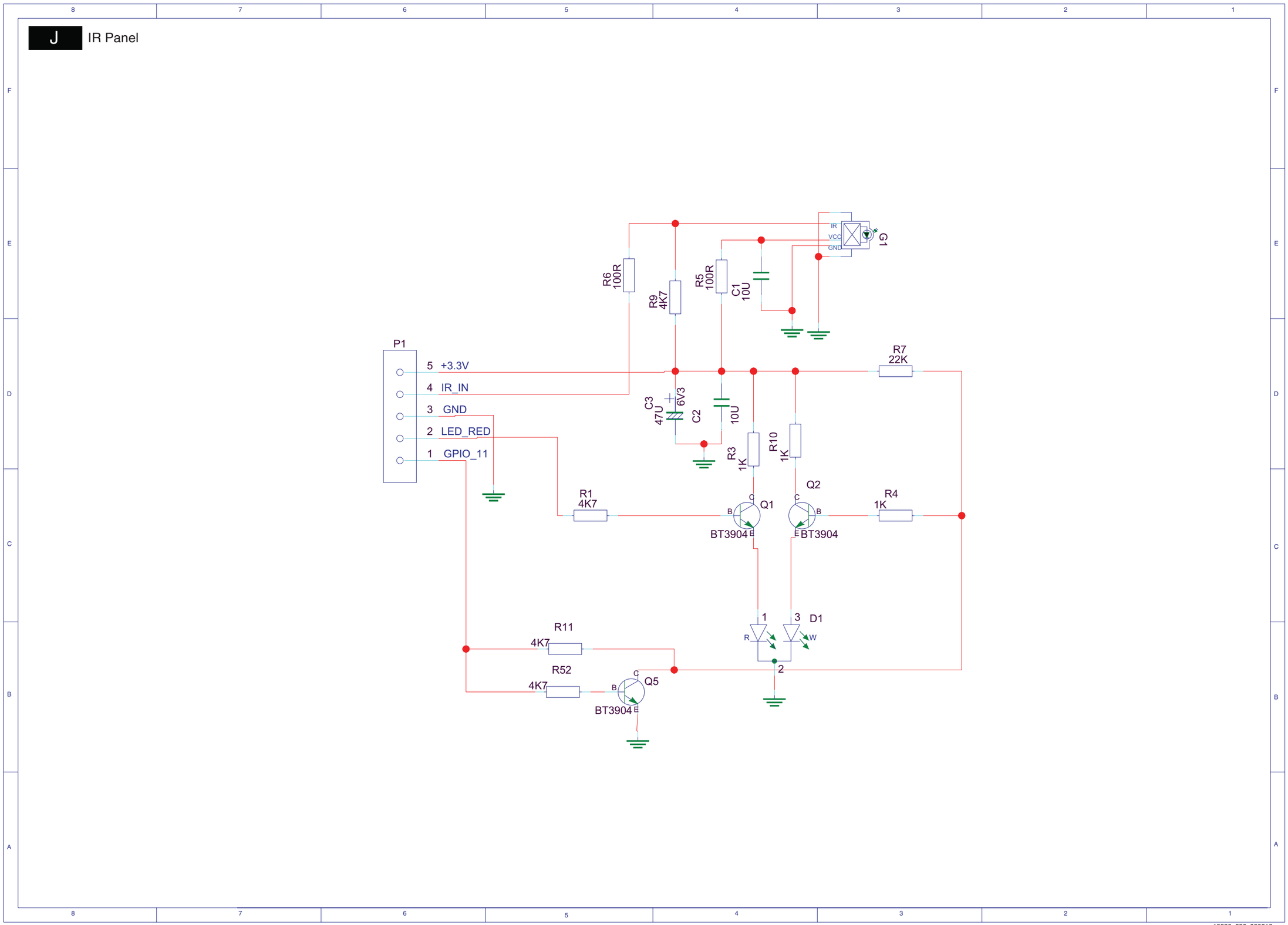
IR Panel

J IR Panel



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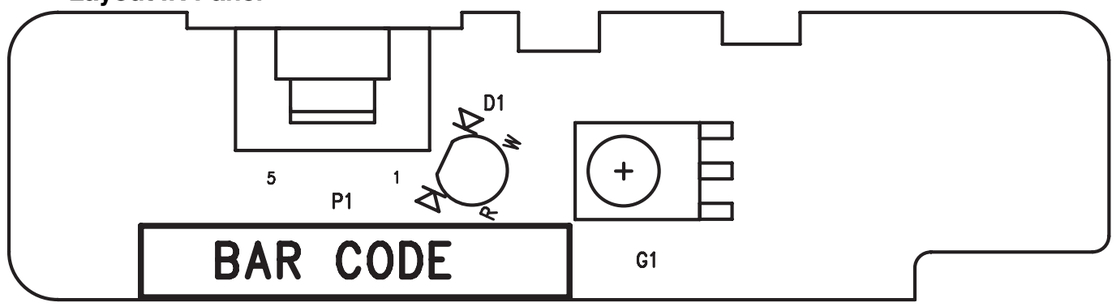
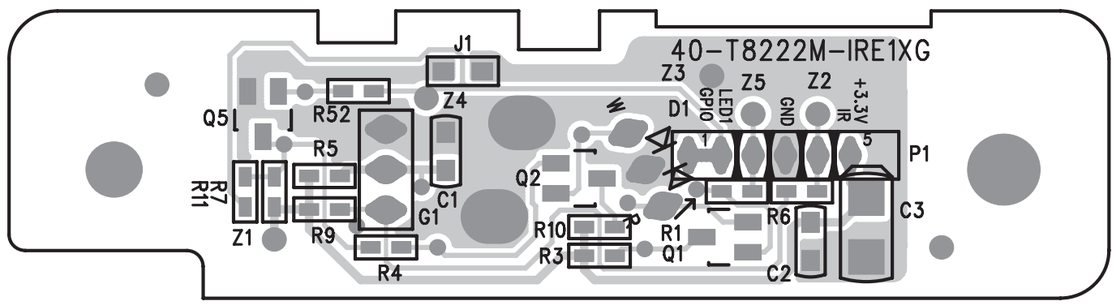
Layout IR Panel





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